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American Foundryman

A PUBLICATION PRESENTING ASSOCIATION AND CHAPTER ACTIVITIES

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September
1941

Sand Control Benefits Industry

THE SUCCESSFUL organization and dissemination of fundamental foundry sand information and technique by the American Foundrymen's Association has materially aided the foundry industry by demonstrating principles of procedure required for improving the surface quality or salability of castings, reducing the cost of production and aiding the foundry through uniform sand deliveries.

It is only within the past two decades that a systematic investigation has been made of the characteristics and physical properties of foundry sand. This has been due to the greater accuracy and control now required in foundries because of competition with other industries as well as within its own industry.

The magnitude of the savings resulting from foundry sand control cannot be estimated accurately but the records show that in some of the larger foundries the savings, which are considered as directly responsible to the proper control and reclamation of foundry sand, have exceeded one hundred thousand dollars per year. In many foundries, the savings resulting from the reduction of foundry defects have amounted to over eleven thousand dollars per year for each percent discount. Therefore, by proper sand control a considerable monetary savings can be made.

The American Foundrymen's Association has in a sense indirectly accomplished these savings through coordinated research projects, cooperation of individual members, and the proper distribution of this knowledge to the small as well as the larger gray iron, malleable, steel and non-ferrous foundries.

The successful application of information on the testing and control of sand must be coordinated with proper supervision if the fullest advantages are to be gained. It should be recognized that the success of foundry sand technique is also dependent on the molding and gating practice.

In summing up—the benefits of scientific sand control have resulted in more uniform shipments of sand, a lower percentage of defective castings, sand conservation and reclamation and an improvement in the surface quality of the castings.

These facts are tangible evidence of the value of cooperation among foundrymen through A.F.A. Every foundryman should become a member of the A.F.A. and should encourage his fellow workers to become members. He should take part in local and national meetings and thereby aid in the advancement and science of foundry technique.

W. G. Reichert

Member, Foundry Sand Research
Executive Committee.

W. G. Reichert, chief foundry metallurgist, American Brake Shoe and Foundry Co., Mahwah, N. J., is known to many foundrymen throughout the country as an authority on foundry sand control. He has presented numerous papers at A.F.A. Conventions and has talked before many A.F.A. Chapters on this subject. Mr. Reichert is serving on various sand committees of the Association, including the Grading and Fineness Committee, of which he is chairman, and as a member of the Executive, Physical Properties of Steel Foundry Sands at Elevated Temperatures, Pamphlet on Sand Properties, and Papers Review committees.

American Foundryman

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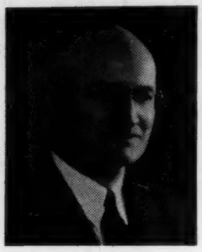
Committees Organized for Coming Year

Technical Activities Correlation Committee

F. J. Walls
Chairman



H. Bornstein

W. J. Corbett

D. P. Forbes

R. J. Allen

IN THIS ISSUE of *American Foundryman* (pages 4 to 11), appears a list of the A.F.A. national committees, their chairmen and members serving on each. This list has been published yearly and emphasizes the importance of the Association's technical activities. These members, outstanding in the foundry industry and noted for their leadership, comprise a most powerful force. They are working for you and all the other members of the Association, as well as for the advancement of the foundry industry as a whole.

You could not afford, nor could any one foundry firm afford, to pay for the time of these men. Yet they are giving freely of their time and service to make the A.F.A. a continuing success. The Association, as a whole, wishes to express its indebtedness to these men who, following in the wake of our pioneers in the technical development of the industry, are carrying the brunt of the Association's work at present, with that other large group, our chapter leaders.

The technical committees listed are in two groups, first the general interest committees, and second, the divisions.

All technical committees are under the general direction of a Board of Directors committee, known as the Technical Activities Correlation committee, with Director Fred J. Walls, International Nickel Co., Detroit, as chairman, and with Past President H. Bornstein, Deere & Co., Moline, Ill., Directors R. J. Allen, Worthington Pump & Machinery Corp., Harrison, N. J., and W. J. Corbett, Atlas Steel Casting Co., Buffalo, N. Y., and Vice President D. P. Forbes, Gunite Foundries Corp., Rockford, Ill., as members.

Division Leaders

W. H. Spencer
Chairman,
Gray Iron Division

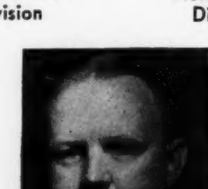
C. E. Sims
Chairman,
Steel Division

V. Reid
Chairman,
Patternmaking
Division

F. C. Cech
Vice Chairman,
Patternmaking
Division

Wm. J. Laird
Chairman,
Non-Ferrous
Division

W. Romanoff
Vice Chairman,
Non-Ferrous
Division



D. P. Forbes
Malleable Division
Chairman,

Division Leaders

The five major divisions are under the chairmanship of men who have won outstanding recognition as leaders in their fields. These are: *Malleable Division*, chairman, D. P. Forbes, president, Gunite Foundries Corp., Rockford, Ill.; *Steel Division*, chairman, C. E. Sims, Battelle Memorial Institute, Columbus, O.; *Gray Iron Division*, chairman, W. H. Spencer, Thomas Foundries, Inc., Birmingham, Ala.; *Non-Ferrous Division*, chairman, Wm. J. Laird, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., with Wm. Romanoff, H. Kramer & Co., Chicago, vice chairman, and *Patternmaking Division*, chairman, Vaughan Reid, president, City Pattern Works, Detroit, with Frank C. Cech, Cleveland Trade School, Cleveland, as vice chairman.

General Interest Committee Leaders

The general interest committees are those whose activities affect members of all divisions.

Foundry Cost Methods: Chairman, R. L. Lee, Liberty Foundry Div., Grede Foundries, Inc., Wauwatosa, Wis. This committee, one of the oldest standing committees of the Association, is now checking the similarities in the cost classifications of the various branches of the industry. In the past it has published simplified cost systems, has in all ways urged that foundrymen know the costs of their castings, and has organized annual con-

vention sessions to discuss the knotty problems such as application of indirect expenses.

Apprentice Training: Chairman, Jas G. Goldie, Cleveland Trade School, Cleveland, O. The oldest standing committee, first organized in 1897, has been most faithful in showing how real training work can be carried on in the foundry. It has done much to stimulate and keep alive foundry training through its contests, papers at its convention sessions, and sponsorship of standard apprentice work schedules.

Foreman Training: Chairman, W. E. George, Campbell Wyant & Cannon Foundry Co., Muskegon, Mich. A more recent committee, but one with an especially important function now, namely, to show what can be done in foundry foreman training work.

Job Evaluation and Time Study: Chairman, Frank E. Wartgow, American Steel Foundries, East Chicago, Ind. Job evaluation and time study, while not new in foundry work, has only recently been given the attention it warrants. This committee has as its function the education of members in the possibilities of improving foundry conditions and personnel relations and the papers which have been presented on this subject are extremely worthy of study by foundrymen of every type.

Plant and Plant Equipment: Chairman, Jas. Thomson, Continental Roll and Steel Foundry Co., East Chicago, Ind. With the many new developments in mechanical equipment and with others coming along, this committee is to keep members in touch with these through discussions at the annual convention. The foundry exhibits are the Association's major educational activity along these lines.

Foundry Refractories: Chairman, J. A. Bowers, American Cast Iron Pipe Co., Birmingham, Ala. It is a well known fact that there is much about foundry refractories and their practical applications that the average foundryman does not know. The work of this committee is that of education on this subject and it has been doing excellent work through sponsoring technical and shop practice papers.

Foundry Sand Research: Technical Director, Dr. H. Ries, Ithaca, N. Y. When, in 1921, the Association began its coordinated sand research program, little was known about definite foundry sand control. This committee, through developing shop and laboratory tests, has placed

J. A. Bowers
Chairman,
Foundry Refractories Committee

J. Thomson
Chairman,
Plant and Plant Equipment Committee

sand control and the knowledge of sand properties on a definite technical basis and has saved foundries hundreds of thousands of dollars through its findings. It has many studies yet to be completed and its work is eagerly studied by those who are particularly interested in improving their plant practices.

Industrial Hygiene Codes: Chairman, Jas. R. Allan, International Harvester Co., Chicago, Ill. A few years ago, when at-

Dr. H. Ries
Technical Director,
Foundry Sand Research Committee

Jas. R. Allan
Chairman,
Industrial Hygiene Codes Committee

tention was directed to the foundry industry and its hygiene problems, particularly as related to ventilation and dust control, the Industrial Hygiene Codes Committee was formed to study the problems involved. A vast amount of information was collected and a program of sponsoring industrial hygiene codes promoted. This committee has issued five codes of recommended good practices and others are be-

J. G. Goldie
Chairman,
Apprentice Training Committee

R. L. Lee
Chairman,
Foundry Cost Methods Committee

ing developed. The results of the commitee's work have been exceptionally beneficial to the foundry industry and great monetary savings have been made by the industry through the committee's efforts.

Cupola Research: The Cupola Research project, while operating under the Gray Iron Division, is, like the sand committee, one of the most important of the Association, having an extensive

D. J. Reese
Chairman,
Cupola Research Committee

plan of several years' work ahead of it. With some 70 members devoting their time to this project, the committee is now headed by Donald J. Reese, International Nickel Co., New York City, well-known national authority on cupola operation. Mr. Reese succeeds A. L. Boegehold of the General Motors Research Laboratories, Detroit. Mr. Boegehold, however, retains his connection with the general Cupola Research committee.

(Concluded on Page 29)

F. E. Wartgow
Chairman,
Job Evaluation and Time Study Committee

W. E. George
Chairman,
Foreman Training Committee

A. F. A. Committee Personnel*
1941-1942

General Committees

Board of Awards

L. N. Shannon, *Chairman* (President 1940-41)
H. S. Washburn (President 1939-40)
Marshall Post (President 1938-39)
H. Bornstein (President 1937-38)
James L. Wick, Jr. (President 1936-37)
D. M. Avey (President 1934-36)
Frank J. Lanahan (President 1933-34)

Nominating Committee

Marshall Post, *Chairman* (President 1938-39)
H. S. Washburn (President 1939-40)
L. N. Shannon (President 1940-41)

Elected Members:	*Alternates:*
M. F. Doty	S. V. Wood
S. C. Wasson	W. D. McMillan
E. F. Hess	T. C. Watts
L. E. Everett	C. J. Lonnee

Membership Committee

B. D. Claffey, *Chairman*
E. W. Horlebein, *Vice Chairman*
C. E. Westover
(Full committee personnel to be announced in October *American Foundryman)*

Castings Promotion Committee

W. J. Grede, *Chairman*
A. C. Denison
W. H. Doerfner
D. P. Forbes
M. J. Gregory
J. F. Lammering
O. A. Pfaff
D. J. Reese
L. P. Robinson
James Suttie

Subcommittee on Film Prospectus

W. H. Doerfner, *Chairman*
A. C. Denison
D. J. Reese

Subcommittee on Finance

L. P. Robinson, *Chairman*
(Committee members to be appointed)

Technical Committees*

Technical Activities Correlation Committee (Board of Directors Committee)

F. J. Walls, *Chairman*
H. Bornstein
R. J. Allen
W. J. Corbett
D. P. Forbes

1 International Relations Committee

F. G. Steinebach, *Chairman*

1-a European Representative

V. Delport

2 Foundry Cost Committee

R. L. Lee, *Chairman* (Representing Gray Iron Founders' Society)
J. D. Burlie (Representing Gray Iron Division)
R. L. Collier (Representing Steel Founders' Society)
W. J. Corbett (Representing Steel Founders' Society)
V. L. Diefenbacher (Representing Gray Iron Div. and Gray Iron Founders' Society)
G. E. Hels (Representing Gray Iron Division)
S. Kitto (Representing Malleable Division and Malleable Founders' Society)
E. J. Metzger (Representing Non-Ferrous Division)
C. S. Roberts (Representing Steel Founders' Society)
E. H. Roeming (Representing Gray Iron Division)
J. A. Wagner (Representing Malleable Division)

3 Apprentice Training Committee

J. G. Goldie**, *Chairman*
J. A. Bowers
S. M. Brah
Frank C. Cech
H. L. Charlson
C. J. Freund
J. E. Goss
John Grennan
F. W. Hunter
V. J. Hydar
J. Morgan Johnson
J. E. Kemp
W. H. Ruten
Wayne Stettbacher
C. W. Wade
A. H. Wornom

3-a Subcommittee on Apprentice Contest

S. M. Brah, *Chairman*
Frank C. Cech
H. L. Charlson
J. Morgan Johnson
C. W. Wade
G. A. Zabel

3-b Subcommittee on Program and Papers

C. J. Freund, *Chairman*
J. E. Goss
F. W. Hunter
Wayne Stettbacher
C. W. Wade

*Unless another member of the National Office staff is listed as a member or secretary of a committee or group of committees, all communications on committee activity should be addressed to R. E. Kennedy, Secretary, American Foundrymen's Association, 222 W. Adams St., Chicago, Ill.
**Ex-officio member of all Apprentice Training committees.

3-c Subcommittee on Publication on Jobs in the Foundry

A. H. Wornom, *Chairman*
Frank C. Cech
C. L. Graeber
F. W. Hunter
J. E. Kemp

3-d Subcommittee on Revision of Four-Year Foundry Apprenticeship Standards

J. Morgan Johnson, *Chairman*
S. M. Brah
John Grennan

4 Program and Papers*

R. E. Kennedy, *Secretary*

4-a Foreman Training Committee

W. E. George, *Chairman*
W. G. Conner, Jr.
G. J. Leroux
T. H. Trevithick
F. E. Wartgow
A. C. Ziebell

4-b Job Evaluation and Time Study Committee

F. E. Wartgow, *Chairman*
Jeff. Alan Westover, *Vice Chairman*
E. L. Berry
W. E. George
E. J. Metzger
R. G. Wieland

4-c Plant and Plant Equipment Committee

James Thomson, *Chairman*
E. W. Beach
W. R. Jennings
H. W. Johnson
H. B. Nye

4-d Refractories Committee

J. A. Bowers, *Chairman*
C. E. Bales
E. J. Carmody
A. H. Dierker
A. V. Leun
John Lowe
G. K. Minert
R. E. Wilke

4-e Sand Shop Operation Course Committee

E. E. Woodliff, *Chairman*
C. P. Randall
D. F. Sawtelle

4-f Lecture Course Committee

H. M. St. John, *Chairman*
H. Bornstein
John Howe Hall
F. J. Walls

6 Foundry Sand Research Committee

Dr. H. Ries**, *Technical Director*
N. F. Hindle, *Secretary*

6-a Executive Committee

Function—To direct the work of the Foundry Sand Research Committee and to pass on recommendations made by its various subcommittees.

Dr. H. Ries, *Chairman*
N. F. Hindle, *Secretary*
A. C. Davis (University)
H. W. Dietert (Sand Testing Equipment)
N. J. Dunbeck (Bond Producer)
G. K. Eggleston (Castings Producer—Non-Ferrous)
W. Finster (Castings Producer—Steel)
J. H. Lansing (Castings Producer—Malleable)
C. Mathiesen (Sand Producer)
C. V. Nass (Castings Producer—Non-Ferrous)
D. L. Parker (Castings Producer—Steel)
C. P. Randall (Castings Producer—Gray Iron)
W. G. Reichert (Castings Producer—Gray Iron)
C. M. Saeger, Jr. (National Bureau)
E. C. Zirzow (Castings Producer—Malleable)

6-a-1 Advisory Committee

Function—To assist the Executive Committee by giving advice on various projects and actions undertaken by the Foundry Sand Research Committee.

W. M. Ball, Jr. (Castings Producer—Non-Ferrous)
H. L. Daasch (University)
H. A. Deane (Castings Producer—Gray Iron)
H. E. Donnocker (Sand Producer)
H. B. Hanley (Castings Producer—Gray Iron)
L. B. Knight, Jr. (Sand Preparation Equipment)
F. A. Melmoth (Castings Producer—Steel)
R. H. Mooney (Castings Producer—Malleable)
W. M. Saunders (Private Laboratory)
H. A. Schwartz (Castings Producer—Malleable)
Stanton Walker (Sand)
F. L. Weaver (Sand Producer)
F. L. Wolf (Castings Producer—Non-Ferrous)

6-b Testing Committees

6-b-1 Subcommittee on Rebonding Clays—Inactive

6-b-2 Subcommittee on Hardness Testing—Inactive

*For Program and Papers Committees on Steel, Malleable, Non-Ferrous, Gray Iron and Patternmaking, see respective divisions.
**Ex-officio member of all Foundry Sand Research committees.

6-b-3 **Subcommittee on Durability**

Function—To devise a satisfactory, reliable and, if possible, simple method for determining the durability of foundry sands.

C. E. Schubert, *Chairman* — N. J. Dunbeck
H. W. Dietert — G. A. Schumacher

6-b-4 **Subcommittee on Grading and Fineness**

Function—To suggest means for determining the fineness of sands and to suggest methods for grading sands and clays.

W. G. Reichert, *Chairman*
H. W. Dietert — C. Mathiesen
N. J. Dunbeck — H. F. Scobie
G. K. Eggleston — E. C. Zirzow

6-b-5 **Subcommittee on Flowability**

Function—To determine and recommend a test for determining flowability of foundry sands.

P. E. Kyle, *Chairman*
H. W. Dietert — Emile Pragoff, Jr.
F. R. Evans — D. F. Sawtelle

6-b-6 **Subcommittee on Compression Tests—Inactive**

6-b-7 **Subcommittee on Physical Properties of Steel Foundry Sands at Elevated Temperatures**

Function—To determine the physical properties of various steel foundry sands and binders at elevated temperatures and to recommend methods for determining such properties.

D. L. Parker, *Chairman*
C. W. Briggs — G. A. Lillieqvist
A. C. Davis — Howard Mason
H. W. Dietert — C. P. Randall
W. Finster — W. G. Reichert
R. A. Gezelius — D. C. Zuege
Advisors:
H. D. Phillips — W. C. Hamilton

6-b-8 **Subcommittee on Sintering Test**

Function—To determine the proper technique and outline the possible pitfalls in the performance of the sintering test, together with a complete investigation as to the accuracy of the present test and, if necessary, suggest revisions to increase accuracy.

J. B. Caine, *Chairman* — C. M. Saeger, Jr.
H. W. Dietert — H. F. Taylor
L. B. Osborne — R. O. Wertz

6-b-9 **Subcommittee on Effect of Sands on the Properties of Castings**

Function—To study the effect of sand properties on the properties of castings.

H. Womochel, *Chairman* — O. C. Hoover
J. B. Caine — R. E. Morey
H. W. Dietert — F. L. Wolf
M. H. Gould — F. J. Wurscher

6-c **Publications Committees**

6-c-1 **Subcommittees on Pamphlet on Sand Properties**

Function—To prepare and publish a book which would explain in simple terms the effect of different variables on foundry sands and the relation of said variables to one another for the purpose of assisting the practical foundryman in the solution of difficulties attributable to foundry sands.

Dr. H. Ries, *Chairman* — C. P. Randall
Myron Park Davis — W. G. Reichert
H. W. Dietert — F. L. Weaver

6-c-2 **Subcommittee on Nomenclature**

Function—To clarify terms applied to the physical properties of foundry sands and to recommend such additional terms as may be required from time to time by future investigations.

A. C. Davis, *Chairman*
H. W. Dietert — John Grennan

6-c-3 **Subcommittee on Papers Review**

Function—To review and pass on papers submitted to the Foundry Sand Research Committee for presentation at the annual convention and for inclusion in the *Transactions* of the Association.

C. P. Randall — W. G. Reichert
Dr. H. Ries

6-d **Committee on Sand Purchase Forms—Inactive**

6-e **Committee on Non-Ferrous Sands—Inactive**

6-f **Special Representatives**

6-f-1 **N.I.S.A. Research Committee**—Dr. H. Ries

6-f-2 **A.F.A. Steel Division Representative on Foundry Sand Research**—D. L. Parker

6-f-3 **A.F.A. Non-Ferrous Division Representative on Foundry Sand Research**—G. K. Eggleston

10 **Industrial Hygiene Codes Committee**

Jas. R. Allan*, *General Chairman*
C. P. Guion — R. W. McCandlish
E. O. Jones — S. McMullan
Carl F. Larsson — John F. Tobin
Nathan Lesser — C. E. Westover
J. G. Liskow

10-a **Subcommittee on Non-Ferrous Melting**

S. McMullan

*Ex-officio member of all Industrial Hygiene Codes committees.

10-b **Subcommittee on Foundry Industry Code**

E. O. Jones, *Chairman*
Jas. R. Allan
S. McMullan
Conferees:
C. S. Anderson
E. H. Ballard
J. O. Houze
L. S. Peregoy
A. B. Root, Jr.

22 **A.F.A. Representatives on Other Society Committees and Cooperative Projects**

22-a **Representative on Alloys of Iron Research—Engineering Foundation**
J. T. MacKenzie

22-b **Representatives on Joint Committee on Foundry Refractories**
Jas. R. Allan — J. A. Kayser
E. J. Carmody — R. E. Kennedy

22-c **Representative on Committee on Classification of Iron and Steel Scrap, R58-36, Division of Simplified Practice, National Bureau of Standards**
H. W. Stuart

24 **A.F.A. Representatives on Committees of the American Society for Testing Materials**

24-a **A-1, on Steel**
E. W. Campion

24-b **A-3, on Cast Iron**
W. H. Spencer

24-c **A-3, Subcommittee II, on Cast Iron Pipe**
H. W. Stuart

24-d **A-3, Subcommittee IV, on Car Wheels**
F. K. Vial

24-e **A-4, on Heat Treatment of Iron and Steel**
E. Touceda

24-f **A-7, on Malleable Iron Castings**
H. A. Schwartz

24-g **B-2, Subcommittee I, on Pure Metals in Ingot Form**
G. H. Clamer

24-h **B-5, on Copper Base Alloys**
F. L. Wolf

24-i **C-8, on Refractories**
Jas. R. Allan

24-j **D-5, on Coal and Coke**
J. T. MacKenzie

24-k **E-1, on Methods of Testing**
L. C. Wilson

24-l **E-7, on Radiography**
C. W. Briggs — John Howe Hall

24-m **E-4, on Metallography**
H. A. Schwartz

24-n **B-7, on Light Metals and Alloys**
Subcommittees I and II—A. Sugar
Subcommittee IV—M. E. Brooks

24-o **American Coordinating Committee on Corrosion**
J. T. MacKenzie

24-p **Committee on Heat Treating Definitions**
H. Bornstein — J. S. Vanick

30 **A.F.A. Representatives on Committees of the American Standards Association**

30-a **Project A-21, Specifications for Cast Iron Pipe and Special Castings**
H. W. Stuart

30-b **Project A-35, Manhole Frames and Covers**
C. J. P. Hoehn — R. E. Moore
E. B. Smith

30-c **Project B-19, Safety Code for Compressed Air Machinery**
J. M. Dolan

30-d **Project B-20, Safety Code for Conveyors and Conveying Machinery**
S. B. Hansen

30-e **Project B-30, Safety Code for Cranes, Derricks and Hoists**
A. H. McDougall

30-f **Project H-13 (1925), Sectional Committee on Outside Dimensions of Plumbago Crucibles for Non-Tilting Furnaces in Non-Ferrous Foundry Practice**
N. K. B. Patch

30-g **Project Z-9, Safety Code for Exhaust Systems**
Jas. R. Allan — O. E. Mount

30-h **Project Z-14, Standards for Drawing and Drafting Room Practice**
E. F. Cone

30-i Project Z-23, Specifications for Sieves for Testing Purposes
Dr. H. Ries

30-j Classification and Designation of Surface Qualities
E. F. Cone

30-k Mechanical Standards
L. M. Sherwin

Divisions

50 Gray Iron Division
W. H. Spencer*, *General Chairman*
F. J. Walls, *Vice Chairman*
R. E. Kennedy, *Secretary*

50-a Advisory Committee
W. H. Spencer, *Chairman*
F. J. Walls, *Vice Chairman*
A. L. Boegehold
J. W. Bolton
Alt.: M. Milligan
H. Bornstein
E. Bremer
V. A. Crosby
Pat Dwyer
John Erler
H. C. Griggs
R. F. Harrington
Robert Job
Max Kuniansky
C. H. Lorig
J. T. MacKenzie
W. E. Mahin
R. G. McElwee
G. P. Phillips
K. H. Priestley
D. J. Reese
W. H. Rother
C. M. Saeger, Jr.
A. E. Schuh
F. G. Sefing
E. K. Smith
A. P. Spooner
J. S. Vanick
E. R. Young

50-b Committee on Pig Iron Qualities
J. T. MacKenzie, *Chairman*
A. L. Boegehold
H. W. Stuart

50-c Committee on Analysis of Casting Defects
W. A. Hambley, *Chairman*
E. J. Carmody, *Vice Chairman*
F. W. Hintze, *Secretary*
A. J. Busch
R. K. Glass
A. S. Klopf
John L. Lowe
W. B. McFerrin
C. V. Nass
A. S. Nichols
F. L. Overstreet
W. G. Reichert
F. L. Weaver
W. C. Wine
Charles Zahn

50-c-1 Subcommittee on Practical Experimental Investigation
A. S. Nichols, *Chairman*
E. J. Carmody, *Vice Chairman*
F. W. Hintze, *Secretary*
W. A. Hambley
John Lowe
F. L. Overstreet

50-d Committee on Fluidity Testing
W. H. Spencer, *Chairman*
C. W. Briggs
C. K. Donoho
G. P. Halliwell
C. F. Joseph
Max Kuniansky
C. M. Saeger, Jr.

50-f Committee on Welding Cast Iron
F. J. Walls, *Chairman*
R. R. Deas, Jr.

50-g Committee on Classification of Graphite in Gray Iron—In Cooperation with A.S.T.M. Committee A-3, Subcommittee VII, on Microstructure of Cast Iron
W. E. Mahin, *Chairman*
J. W. Bolton
Alt.: A. J. Smith
Alfred Boyles
G. P. Phillips
P. C. Rosenthal

50-i Representative on A.S.T.M. Committee A-3, Subcommittee II, on Cast Iron Pipe
H. W. Stuart

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51-k Representative on A.S.T.M. Committee A-1, Specifications for Steel
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52-e Representative on A.S.T.M. Committee A-7, Malleable Casting Specifications
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Day, W. E., Jr., Met., Mack Mfg. Co., Jersey Ave., New Brunswick, N. J. (50-p-8)
Deane, H. A., Asst. Works Mgr., Brake Shoe & Castings Div., American Brake Shoe & Foundry Co., 230 Park Ave., New York City (6-a-1, 50-n)
Deas, R. R., Jr., Asst. to Vice Pres., American Cast Iron Pipe Co., Birmingham, Ala. (50-f, 50-s)
Delport, V., Penton Publishing Co., 7 Kenton Gardens, Kenton, near Harrow, Middlesex, England (1-a)

Demmler, A. W., Met. Engr., Vanadium Corp. of America, Bridgeville, Pa. (50-t-3)

Denison, A. C., Pres., Fulton Foundry & Machine Co., E. 75th St. and Morgan Ave., Cleveland, O. (Castings Promotion Committee, Subcommittee on Film Prospectus, 50-q)

Diefenbacher, V. L., Cost Supv., Hamilton Foundry & Machine Co., 1551 Lincoln Ave., Hamilton, O. (2)

Dierker, A. H., Res. Engr., Engineering Experiment Station, Ohio State University, Columbus, O. (4-d, 50-t-2-a, 50-t-3)

Dietert, H. W., Pres., Harry W. Dietert Co., 9330 Roselawn Ave., Detroit, Mich. (6-a, 6-b-3, 6-b-4, 6-b-5, 6-b-7, 6-b-8, 6-b-9, 6-c-1, 6-c-2)

Di Giulio, A., Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich. (50-p-2)

Dobson, D. I., Met., General Malleable Corp., Waukesha, Wis. (52-g)

Doerfner, W. H., General Mgr., Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich. (Castings Promotion Committee, Subcommittee on Film Prospectus)

Dolan, J. M., Compressor Engineering Div., Sullivan Machinery Co., Michigan City, Ind. (30-c)

Donaldson, R. A., Met., Woodward Iron Co., Woodward, Ala. (50-t-2-a)

Donnocker, H. E., Field Engr., Ottawa Silica Co., Ottawa, Ill. (6-a-1)

Donoho, C. K., Met., American Cast Iron Pipe Co., Birmingham, Ala. (50-d, 50-t-6)

Dost, F. J., Supt., Sterling Foundry Co., Wellington, O. (50-n, 50-p-7, 50-q)

Doty, M. F., Mgr., Casting Div., Clark Equipment Co., Buchanan, Mich. (Nominating Committee)

Dunbeck, N. J., Vice Pres., Eastern Clay Products Co., Eifort, O. (6-a, 6-b-3, 6-b-4)

Dunn, L. A., Supt. of Foundries, General Electric Co., Erie, Pa. (52-g)

Dwyer, Pat, Engineering Editor, *The Foundry,* Penton Bldg., Cleveland, O. (50-a, 50-n)

Eagan, T. E., Chief Met., Cooper-Bessemer Corp., Grove City, Pa. (50-n, 50-p-7, 50-p-8, 50-q)

Eash, J. T., Res. Met., International Nickel Co., 30 Oak St., Bayonne, N. J. (50-p-7)

Eddy, W. P., Jr., Met. & Service Engr., General Motors Truck & Coach Div., Yellow Truck & Coach Mfg. Co., South Blvd., Pontiac, Mich. (50-p-8)

Eggleston, G. K., Chief Engr., Barnes Mfg. Co., Mansfield, O. (6-a, 6-b-4, 6-f-3, 53-c, 53-c-1, 53-h)

Erler, John, Met., Farrel-Birmingham Co., Ansonia, Conn. (50-a, 54-p-4, 51-o)

Evans, F. R., Foundry Instr., Massachusetts Institute of Technology, Room 35-262, Cambridge, Mass. (6-b-5)

Evans, G. S., Met., Mathieson Alkali Works, 60 E. 42nd St., New York City (50-t, 50-t-3, 50-t-7)

Everett, L. E., Fdry. Supt., Kaukauna Machine Corp., Kaukauna, Wis. (Nominating Committee)

Everhart, J. O., Asst. to Gen. Supt., Kentucky Fire Brick Co., Haldeman, Ky. (50-t-6)

Finster, Werner, Met., Reading Steel Casting Div., American Chain & Cable Co., Reading, Pa. (6-a, 6-b-7, 51-d, 51-e)

Forbes, D. P., Pres., Gunite Foundries Corp., Rockford, Ill. (Vice Pres., Technical Activities Correlation Committee, Castings Promotion Committee, 50-p-8, 52, 52-a)

Frank, R. H., Chief Met., Bonney-Floyd Co., Columbus, O. (51-e)

Freund, C. J., Dean, College of Engrg., University of Detroit, Detroit, Mich. (3, 3-b)

Fulton, A. M., Supt., Northern Malleable Iron Co., St. Paul, Minn. (52-a, 52-g, 52-h)

Galloway, C. D., III, Fdry. Supt., Chambersburg Engineering Co., Chambersburg, Pa. (50-p-8)

Gardner, H. B., Res. Associate, Non-Ferrous Ingot Metal Institute, National Bureau of Standards, Washington, D. C. (53-a, 53-e)

Gellert, John H., Fdry. Supt., Nichol-Straight Foundry Co., 3174 S. Archer Ave., Chicago, Ill. (50-p-8)

George, W. B., Met. and Foundry Engr., R. Lavin & Sons, Inc., 3426 S. Kedzie Ave., Chicago, Ill. (53-c)

George, W. E., Asst. to Management, Campbell Wyant & Cannon Foundry Co., Muskegon, Mich. (4-a, 4-b)

Gezelius, R. A., Met. Engr., General Steel Castings Corp., Eddystone, Pa. (6-b-7, 51-a, 51-d, 51-g)

Glass, R. K., Met., Republic Steel Corp., S. Park Ave., Buffalo, N. Y. (50-c)

Goldie, James G., Fdry. Instr., Cleveland Trade School, 535 Eagle Ave., Cleveland, O. (3)

Goss, J. E., Apprentice Supv., Brown & Sharpe Mfg. Co., Providence, R. I. (3, 3-b)

Goudielock, Wm. B., Met., Phelps Dodge Copper Products Corp., 40 Wall St., New York City (54-c-4)

Goudy, O. E., Fdry. Supt., Kelsey-Hayes Wheel Co., 3600 Military Ave., Detroit, Mich. (50-q)

Gould, M. H., Member, Tech. Staff, Aluminum Co. of America, 2210 Harvard Ave., Cleveland, O. (6-b-9)

Graeber, C. L., Apprentice Coordinator, Milwaukee Vocational School, Milwaukee, Wis. (3-c)

Grede, W. J., Pres., Grede Foundries, Inc., Wauwatosa, Wis. (Castings Promotion Committee)

Greenidge, C. T., Met., Battelle Memorial Institute, 505 King Ave., Columbus, O. (51-d)

Gregg, A. W., Fdry. Engr., Fdry. Equipment Div., Whiting Corp., Harvey, Ill. (50-t, 50-t-1, 51-a, 51-c)

Gregory, M. J., Factory Mgr., Caterpillar Tractor Co., Peoria, Ill. (Director, Castings Promotion Committee)

Grennan, John, Instr., Dept. of Metal Processing, University of Michigan, Ann Arbor, Mich. (3, 3-d, 6-c-2, 50-s, 50-t-5)

Griggs, H. C., Met., Waterbury-Farrel Foundry & Machine Co., 453 Bank, Waterbury, Conn. (50-a)

Grotts, Fred, Pres., Ft. Pitt Steel Casting Co., McKeesport, Pa. (51-a)

Guion, C. P., Fdry. Equipment Engr., 3843 N. Central Park Ave., Chicago, Ill. (10)

Hageboeck, A. E., Pres., Frank Foundries Corp., 2020 3rd Ave., Moline, Ill. (50-p-8)

Hall, John Howe, 228 W. Willow Grove Ave., Chestnut Hill, Philadelphia, Pa. (4-f, 24-l, 51-a, 51-b, 51-m, 51-o, 51-p)

Halliwell, G. P., Dir. of Res., H. Kramer & Co., 1347 W. 21st St., Chicago, Ill. (50-d, 53-h)

Wis. (50-c, 50-c-1, 50-p-6, 50-p-8, 50-t-1, 50-t-5)

Hamblin, K. H., Gen. Supt., Albion Malleable Iron Co., Albion,

Hambley, W. A., Fdry. Met., Allis-Chalmers Mfg. Co., Milwaukee, Mich. (52-c)

Hamilton, W. C., Research Director, American Steel Foundries, East Chicago, Ind. (6-b-7, 51-e)

Hanley, H. B., Foundry Mgr., American Laundry Machinery Co., 50 Sherer St., Rochester, N. Y. (6-a-1)

Hansen, S. B., Industrial Engineering & Construction Dept.,, International Harvester Co., 180 N. Michigan Ave., Chicago, Ill. (30-d)

Hardy, Chas., Pres., Chas. Hardy, Inc., 420 Lexington Ave., New York City (50-p-7)

Harrington, R. F., Fdry Supt. and Chief Met., Hunt-Spiller Mfg. Corp., 383 Dorchester Ave., Boston, Mass. (50-a, 50-p-7)

Harris, W. C., Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. (51-g)

Healey, M. V., Casting Met., General Electric Co., 1 River Rd., Schenectady, N. Y. (53-a, 53-b)

Hels, G. E., Prod. Mgr., Vilter Mfg. Co., 2217 S. First St., Milwaukee, Wis. (2)

Hess, E. F., Met. Engr., Ohio Injector Co., Wadsworth, O. (Nominating Committee, 53-a, 53-c, 53-c-2, 53-f)

Hewitt, L. C., Laclede-Christy Clay Products Co., 1711 Ambassador Bldg., St. Louis, Mo. (50-t, 50-t-6)

Higgins, A. K., Met., Allis-Chalmers Mfg. Co., Milwaukee, Wis. (53-c)

Hindle, N. F., Asst. Secretary, American Foundrymen's Association, 222 W. Adams St., Chicago, Ill.

Hine, R. F., Fdry, Met., Studebaker Corp., South Bend, Ind. (50-o)

Hintze, F. W., Salesman, Illinois Clay Products Co., 608 S. Dearborn St., Chicago, Ill. (50-c, 50-c-1)

Hoehn, C. J. P., Enterprise Foundry Co., 2902 19th St., San Francisco, Calif. (30-b)

Holtby, Fulton, Asst. Prof., University of Minnesota, Mechanical Engineering Bldg., Minneapolis, Minn. (50-t-5)

Hoover, O. C., Supt., Acme Foundry Co., 2503 22nd St., Detroit, Mich. (6-b-9)

Horlebein, E. W., Pres., The Gibson & Kirk Co., Warner & Bayard Sts., Baltimore, Md. (Membership Committee)

Houze, J. O., Mgr., National Malleable & Steel Castings Co., 1400 S. 52nd Ave., Cicero, Ill. (10-b)

Hunter, F. W., Fdry. Supt., Sargent & Co., New Haven, Conn. (3, 3-b, 3-c)

Hydar, V. J., Personnel Div., Lockhead Aircraft Corp., Burbank, Calif. (3)

Hynan, E. T., Patt. Supt., Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich. (54-a)

Jackson, J. E., Met. Engr., Copper, Iron and Steel Development Assn., 5005 Superior Ave., Cleveland, O. (50-p-3, 50-p-8)

Jameson, A. H., Mgr. of Castings Sales, Malleable Iron Fittings Co., Branford, Conn. (51-p)

Jennings, E. G., Met., Canadian Bronze Co., Ltd., 999 Delorimier Ave., Montreal, Que., Canada (53-c, 53-c-4)

Jennings, W. R., Fdry. Supt., John Deere Tractor Co., Waterloo, Iowa (4-c, 50-t-1)

Job, Robert, Vice Pres., Milton Hersey Co., Ltd., 980 St. Antoine St., Montreal, Que., Canada (50-a)

Johnson, H. W., Supt., Blast Furnace Dept., Inland Steel Co., East Chicago, Ind. (50-t-2-a)

Johnson, H. W., Supt., Northwestern Foundry Co., 662 W. Roosevelt Rd., Chicago, Ill. (4-c)

Johnson, J. Morgan, Vocational Supv., Tri-City Manufacturers' Assn., Box 148, Moline, Ill. (3, 3-a, 3-d)

Johnson, W. V., Patt. Supt., Oliver Farm Equipment Co., South Bend, Ind. (54-a, 54-d)

Johnston, T. G., Met. Engr., Pig Iron Div., Republic Steel Corp., Republic Bldg., Cleveland, O. (50-t, 50-t-2-a)

Jominy, W. E., Met., Chrysler Corp., Detroit, Mich. (50-p-2, 50-p-5, 50-p-8)

Jones, E. O., Belle City Malleable Iron Co., Racine, Wis. (10, 10-b)

Jones, W. E., Met., Stockham Pipe Fittings Co., Birmingham, Ala. (52-c)

Joseph, C. F., Met., Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich. (50-d, 50-t-5, 52-a, 52-g)

Joseph, T. L., Head, Dept. of Met., University of Minnesota, Minneapolis, Minn. (50-t-2-a)

Judson, H. H., Fdry. Supt., Goulds Pumps, Inc., 238 Fall St., Seneca Falls, N. Y. (50-s, 50-t-3)

Juram, W. C., Jr., Field Engr., Bristol Co., Market St., National Bank Bldg., Philadelphia, Pa. (50-t-1)

Kanter, J. J., Res. Met., Crane Co., 4100 S. Kedzie Ave., Chicago, Ill. (50-t-5)

Kayser, J. A., Chief Refractories Engr., Laclede-Christy Clay Products Co., 1711 Ambassador Bldg., St. Louis, Mo. (22-b, 50-t-6)

Kelin, J. W., Asst. Sales Mgr., Federated Metals Div., American Smelting & Refining Co., 4041 Park Ave., St. Louis, Mo. (53-a, 53-b)

Kelly, J. M., Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (53-e)

Kemp, J. E., Supv. of Training, Walworth Co., Kewanee, Ill. (3, 3-c)

Kempf, L. W., Met., Aluminum Research Labs., Aluminum Co. of America, 2210 Harvard Ave., Cleveland, O. (53-b)

Kennedy, R. E., Secretary, American Foundrymen's Association, 222 W. Adams St., Chicago, Ill.

Kennedy, W. A., Supervisor of Products, Grinnell Co., Inc., 260 W. Exchange St., Providence, R. I. (52-c, 52-g)

Kerlin, W. W., Rep., Meehanite Metal Corp., 311 Ross St., Pittsburgh, Pa. (50-p-3)

Kindt, E. T., Pres., Kindt-Collins Co., 12697 Elmwood Ave., Cleveland, O. (54-a, 54-d)

Kitto, S., Treas., Belle City Malleable Iron Co., Racine, Wis. (2)

Klopf, A. S., Vice Pres., Hansell-Elcock Co., 3153 S. California, Chicago, Ill. (50-c)

Knight, L. B., Jr., Vice Pres. in Charge of Sales, National Engineering Co., 549 W. Washington St., Chicago, Ill. (6-a-1)

Kuniansky, Max, General Mgr., Lynchburg Foundry Co., Lynchburg, Va. (50-a, 50-d, 50-t, 50-t-2-b)

Kyle, P. E., Asst. Prof., Mech. Engrg., Massachusetts Institute of Technology, Cambridge, Mass. (6-b-5, 50-s)

Laird, Wm. J., Met., Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa. (53, 53-a)

Lammering, J. F., Vice Pres., Hammond Brass Co., Hammond, Ind. (Castings Promotion Committee)

Lanahan, Frank J., Pres., Ft. Pitt Malleable Iron Co., P. O. Box 505, Pittsburgh, Pa. (Board of Awards)

Lancashire, Ernest, Chief Chem., Detroit Steel Casting Co., 4069 Michigan St., Detroit, Mich. (51-o)

Landgraf, G. F., Chief Met., Lebanon Steel Foundry, Lebanon, Pa. (51-e)

Lane, P. S., Res. Engr., Muskegon Piston Ring Co., 6th and Alpha Sts., Muskegon, Mich. (50-n, 50-p-8)

Lansing, J. H., Shop Practice Engr., Malleable Founders' Society, Union Commerce Bldg., Cleveland, O. (6-a, 52-a, 52-c, 52-g, 52-g-1, 52-h)

Larsson, Carl F., American Air Filter Co., Inc., 20 N. Wacker Dr., Chicago, Ill. (10)

Lauenstein, C. F., Chief Met., Link-Belt Co., Indianapolis, Ind. (52-c)

Lawson, C. C., Supt., Wagner Malleable Iron Co., Decatur, Ill. (52-g)

Lee, Ralph L., Secy.-Treas., Liberty Foundry Div., Grede Foundries, Inc., Wauwatosa, Wis. (2)

Lefler, M. J., Works Mgr., Western Foundry Co., 3634 S. Kedzie Ave., Chicago, Ill. (50-t-2-a, 50-t-3, 50-t-5)

Leisk, J. A., Gen. Supt., Foundries & Patt. Shops, Allis-Chalmers Mfg. Co., Milwaukee, Wis. (54-a, 54-c)

Leroux, Geo. J., Asst. Mgr., National Malleable & Steel Casting Co., 10600 Quincy Ave., Cleveland, O. (4-a)

Lesser, Nathan, Deere & Co., Moline, Ill. (10)

Leun, A. V., Refractories Engr., Bethlehem Steel Co., Bethlehem, Pa. (4-d)

Levi, W., Met., Lynchburg Foundry Co., Radford, Va. (50-t-5)

Lillieqvist, G. A., Chief Met., American Steel Foundries, East Chicago, Ind. (6-b-7, 51-o, 51-p)

Lindgren, R. A., Supt., Blast Furnaces, Wisconsin Steel Works, 2701 E. 106th St., Chicago, Ill. (50-t-2-a)

Lindsay, R. W., Res. Asst., Association of Manufacturers of Chilled Car Wheels, 445 N. Sacramento Blvd., Chicago, Ill. (50-t-4)

Linnell, W. S., Met., Wisconsin Steel Co., 2701 E. 106th St., Chicago, Ill. (50-o)

Liskow, J. G., Chief Engr., C. B. Schneible Co., 3951 Lawrence Ave., Chicago, Ill. (10)

Lonnee, C. J., Supt., Sparta Foundry Div., Muskegon Piston Ring Co., Sparta, Mich. (Nominating Committee)

Lorig, C. H., Met., Battelle Memorial Institute, 505 King Ave., Columbus, O. (50-a, 50-p-3, 50-q, 50-t-3, 51-a)

Lottier, L. F., Asst. Met., Peoples Gas Light & Coke Co., 122 S. Michigan Ave., Chicago, Ill. (50-p-2)

Lowe, John, Battelle Memorial Institute, 505 King Ave., Columbus, O. (4-d, 50-c, 50-c-1, 50-t, 50-t-1, 50-t-5)

Maack, H. W., Chief Chem. & Met., Crane Co., 4100 S. Kedzie Ave., Chicago, Ill. (52-a)

MacKenzie, J. T., Met., American Cast Iron Pipe Co., Birmingham, Ala. (22-a, 24-j, 24-o, 50-a, 50-b, 50-k, 50-l, 50-m, 50-p-1, 50-p-8, 50-q, 50-s, 50-t, 50-t-1, 50-t-3, 50-t-4, 50-t-5, 50-t-6)

Mahin, W. E., Met. Engr., Feeder Engrg. Dept., Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (50-a, 50-g, 50-q)

Mason, Howard, Personnel Mgr., Symington-Gould Corp., Depew, N. Y. (6-b-7)

Massari, S. C., Res. Met., Association of Manufacturers of Chilled Car Wheels, 445 N. Sacramento Blvd., Chicago, Ill. (50-p-4, 50-p-5, 50-q, 50-s, 50-t, 50-t-4)

Mathieson, C., Prod. Mgr., Whitehead Bros. Co., Box 864, Albany, N. Y. (6-a, 6-b-4)

Mathis, E. C., Met., Pickands Mather & Co., 332 S. Michigan Ave., Chicago, Ill. (50-t-2-a)

May, P. J., Service Engr., Cleveland Quarries Co., 1125 Builders Exchange, Cleveland, O. (50-t-6)

McCandlish, R. W., Research Corp., 59 E. Van Buren St., Chicago, Ill. (10)

McCarroll, R. H., Chief Chem. & Met., Ford Motor Co., Dearborn, Mich. (50-p-8)

McClaren, Lewis D., Mgr., By-Prod. Coke Dept., Republic Coal & Coke Co., 8 S. Michigan Ave., Chicago, Ill. (50-t)

McDougall, A. H., Vice Pres., Whiting Corp., Harvey, Ill. (30-e)

McElwee, R. G., Mgr., Fdry. Alloy Div., Vanadium Corp. of America, 2440 Book Bldg., Detroit, Mich. (50-a, 50-n, 50-p-3, 50-p-5, 50-p-6, 50-p-7, 50-q, 50-t, 50-t-2. 50-t-2-c)

McFerrin, W. B., Fdry. Met., Cadillac Motor Car Co., 2860 Clark Ave., Detroit, Mich. (50-c)

McGrail, C. R., Mgr., Nickel Dept., Steel Sales Corp., 3348 S. Pulaski Rd., Chicago, Ill. (50-p-8)

McMahon, W. O., Chief Fdry. Met., Sloss-Sheffield Steel & Iron Co., 3131 1st Ave., N., Birmingham, Ala. (50-t, 50-t-2-a)

McMillan, W. D., Met., International Harvester Co., Blue Island and Western Aves., Chicago, Ill. (Nominating Committee, 52-g)

McMullan, S., Western Electric Co., Cicero, Ill. (10, 10-a, 10-b)

Melmoth, F. A., Vice Pres., Detroit Steel Casting Co., 4069 Michigan St., Detroit, Mich. (6-a-1, 51-a, 51-b, 51-c)

Meloche, D. H., Mgr., Met. & Chem. Lab., Institute of Thermal Research, American Radiator & Standard Sanitary Corp., 675 Bronx River Rd., Yonkers, N. Y. (50-t-2-b)

Metzger, E. J., Gen. Supt., Falcon Bronze Co., 218 S. Phelps St., Youngstown, O. (2, 4-b, 53-h)

Miller, B. A., Chief Met., Baldwin Locomotive Works, Cramp Brass & Iron Foundries Div., Paschall Station, Philadelphia, Pa. (50-t-1, 53-a, 53-d)

Milligan, M., The Lunkenheimer Co., Beekman and Waverly Aves., Cincinnati, O. (50-a, 51-0)

Minert, G. K., Asst. Met., Guite Foundries Corp., Rockford, Ill. (4-d)

Mooney, R. H., Chief Plant Engr., Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Mich. (6-a-1)

Moore, R. E., Vice Pres. and Treas., Flockhart Foundry Co., 83 Polk St., Newark, N. J. (30-b)

Morey, R. E., Sand Research, Naval Research Laboratory, Washington, D. C. (6-b-9)

Morken, C. H., Supt. of Operations, Carondelet Foundry Co., 2101 S. Kingshighway, St. Louis, Mo. (50-p-6, 50-p-7)

Mount, O. E., Treas., American Steel Foundries, 410 N. Michigan Ave., Chicago, Ill. (30-g)

Mulcahy, B. P., Res. Engr., Citizens' Gas & Coke Utility, 47 S. Pennsylvania St., Indianapolis, Ind. (50-t, 50-t-4)

Munson, R. S., Vice Pres., Atlantic Steel Casting Co., 6th and Lloyd Sts., Chester, Pa. (51-p)

Myers, Harold, Chief Met., Sealed Power Corp., Sanford and Keating Sts., Muskegon, Mich. (50-p-8)

Nass, C. V., Asst. Supt. of Foundries, Fairbanks Morse & Co., Beloit, Wis. (6-a, 50-c, 53-a, 53-f)

Nichols, A. S., Vice Pres., Illinois Clay Products Co., 608 S. Dearborn St., Chicago, Ill. (50-c, 50-c-1, 50-t-6)

Nye, Howard B., Foundry Engr., New York Air Brake Co., Watertown, N. Y. (4-c)

O'Brien, B. C., Vice Pres., Roots-Connersville Blower Co., Connersville, Ind. (50-t, 50-t-1)

O'Connor, D. Frank, Divisional Supt., Walworth Co., 1st and O Sts., S. Boston, Mass. (53-a, 53-c)

Ogden, R. L., Supt. of Fdries., Stockham Pipe Fittings Co., Birmingham, Ala. (52-b)

Osborn, L. B., Sales Mgr., Hougland & Hardy, Inc., Evansville, Ind. (6-b-8)

Overstreet, F. L., Fdry. Engr., Illinois Clay Products Co., 1178 22nd St., Moline, Ill. (50-c, 50-c-1)

Page, E. W., Mgr., General Electric X-Ray Corp., 2012 W. Jackson Blvd., Chicago, Ill. (51-e)

Parker, D. L., Fdy. Supt., General Electric Co., 69 Norman St., Everett, Mass. (6-a, 6-b-7, 6-f-2, 51-a, 51-h)

Parsons, R. W., Met., Ohio Brass Co., Mansfield, O. (53-a, 53-f)

Patch, N. K. B., Secretary, Lumen Bearing Co., 197 Lathrop St., Buffalo, N. Y. (30-f)

Peregoy, L. S., Pres., Sivyer Steel Casting Co., Milwaukee, Wis. (10-b)

Peters, R. V., Supt., Bridgeport Brass Co., Bridgeport, Conn. (53-c-4)

Peterson, E. A., Dodge Motor Div., Chrysler Corp., Detroit, Mich. (50-t-6)

Pfaff, O. A., Pres., American Foundry Equipment Co., Mishawaka, Ind. (Director, Castings Promotion Committee)

Phillips, G. P., Chief Met., Automotive Foundry Div., International Harvester Co., 2600 W. 31st, Chicago, Ill. (50-a, 50-g, 50-n, 50-p-5, 50-p-8, 50-q, 50-t, 50-t-5)

Phillips, H. D., Plant Mgr., Lebanon Steel Foundry, Lebanon, Pa. (6-b-7, 51-a, 51-c)

Phillips, W. J., Asst. Works Mgr., Symington-Gould Corp., 311 Oakdale Drive, Rochester, N. Y. (51-c)

Post, Marshall, Vice Pres. & Works Mgr., Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa. (Director, Board of Awards, Nominating Committee)

Pragoff, Emile, Jr., Sales Supv., Hercules Powder Co., Delaware Trust Bldg., Wilmington, Del. (6-b-5)

Priestley, K. H., Met., Eaton-Erb Foundry Div., Eaton Mfg. Co., Vassar, Mich. (50-a, 50-o)

Pryse, L. W., Salesman, Hickman Williams & Co., First National Bank Bldg., Cincinnati, O. (50-t-2-b)

Pugsley, William, Mgr. of Engineering, The Hays Corp., 750 E. 8th St., Michigan City, Ind. (50-t-1)

Pyle, A., Jr., Secy.-Treas., Pyle Pattern & Mfg. Co., 1201 Sanford St., Muskegon, Mich. (54-a, 54-c)

Randall, C. P., Service Engr., Eastern Clay Products, Inc., Eifort, O. (4-e, 6-a, 6-b-7, 6-c-1, 6-c-3)

Reed, C. S., Jr., Secretary, Chicago Retort & Fire Brick Co., 208 S. La Salle St., Chicago, Ill. (50-t, 50-t-6)

Reed, H. B., Met., Westinghouse Air Brake Co., Wilmerding, Pa. (53-c)

Reeder, D. B., Met., Electro Metallurgical Co., 230 N. Michigan Ave., Chicago, Ill. (50-t)

Reese, D. J., Met., International Nickel Co., 67 Wall St., New York City (Castings Promotion Committee, Subcommittee on Film Prospectus, 50-a, 50-p-6, 50-t)

Reichert, W. G., Gen. Fdry. Met., American Brake Shoe & Foundry Co., Mahwah, N. J. (6-a, 6-b-4, 6-b-7, 6-c-1, 6-c-3, 50-c, 50-t-2-a, 50-t-2-b)

Reid, Vaughn, Pres., City Pattern Works, 1161 Harper Ave., Detroit, Mich. (54, 54-a)

Reynolds, J. E., Met., U. S. Pipe & Foundry Co., 2016 St. Louis Ave., Bessemer, Ala. (50-t-2-a)

Rich, H. M., Hickman Williams & Co., Ford Bldg., Detroit, Mich. (50-t-2-a)

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Rittinger, C. J., Fdry. Met., Riley Stoker Corp., Ft. of Walker St., Detroit, Mich. (50-p-8)

Roast, Harold J., Vice Pres., Canadian Bronze Co., Ltd., 999 Delorimier Ave., Montreal, Que., Canada (Director, 53-a, 53-f)

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Romanoff, Wm., Vice Pres., H. Kramer & Co., 2119 S. Loomis St., Chicago, Ill. (53, 53-a)

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Rosenthal, P. C., Met. Engr., Battelle Memorial Institute, 505 King Ave., Columbus, O. (50-g)

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Rother, W. H., Met., Buffalo Foundry & Machine Co., 1543 Fillmore Ave., Buffalo, N. Y. (50-a)

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Rudesill, L. H., Met., Griffin Wheel Co., 445 N. Sacramento Blvd., Chicago, Ill. (50-p-4, 50-t-3)

Ruten, W. H., Asst. Prof. in Prac. Mechs., Polytechnic Institute of Brooklyn, Brooklyn, N. Y. (3)

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Sawtelle, D. F., Met., Malleable Iron Fittings Co., Branford, Conn. (4-e, 6-b-5, 51-g, 52-g)

Schilling, P. R., Asst. to Pres., Superior Steel & Malleable Castings Co., Benton Harbor, Mich. (52-g)

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Schuh, A. E., Dir. of Research, U. S. Pipe & Foundry Co., Burlington, N. J. (50-a, 50-t, 50-t-5)

Schumacher, G. A., Met., Albion Malleable Iron Co., Albion, Mich. (6-b-3, 52-g)

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Smith, A. J., The Lunkenheimer Co., Beekman and Waverly Aves., Cincinnati, O. (50-g)

Smith, E. B., Vice Pres., American Brake Shoe & Foundry Co., Brake Shoe & Castings Div., 230 Park Ave., New York City (30-b)

Smith, E. K., Met., Electro Metallurgical Co., 1210 Ford Bldg., Detroit, Mich. (50-a, 50-p-3, 50-p-6, 50-p-7, 50-q, 50-t, 50-t-2-b, 50-t-2-c, 52-a)

Smith, L. C., Engr., Spencer Turbine Co., Hartford, Conn. (50-t-1)

Spencer, W. H., Thomas Foundries, Inc., Birmingham, Ala. (24-b, 50, 50-a, 50-d, 50-p-8)

Spooner, A. P., Met. Eng., Bethlehem Steel Co., Bethlehem, Pa. (50-a, 51-a, 51-e, 51-o)

Stantial, G. B., Foundry Supt., Illinois Malleable Iron Co., 1801 Diversey Parkway, Chicago, Ill. (52-g)

Stavert, J. C., North Works Supt., Babcock-Wilcox & Goldie-McCulloch, Ltd., Galt, Ont., Canada (50-q)

Steinebach, F. G., Editor, *The Foundry*, Penton Bldg., Cleveland, O. (International Relations Committee, 50-s)

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Thomas, L. B., Chief Met., Campbell Wyant & Cannon Foundry Co., Muskegon, Mich. (50-p-8, 50-t-5)

Thomson, James, Chief Plant Engr., Continental Roll & Steel Foundry Co., East Chicago, Ind. (4-c)

Timmons, G. A., Met., Climax Molybdenum Co., 14410 Woodrow Wilson, Detroit, Mich. (50-p-5)

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Tour, Sam, Vice Pres., Lucius Pitkin, Inc., 47 Fulton St., New York City (53-h)

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Vining, R. E., Supv. of Methods, Revere Copper & Brass Co., Baltimore, Md. (53-c-4)

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Warchol, Michael, Met., Atlas Foundry Co., 131 S. Livernois, Detroit, Mich. (50-p-8)

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Weaver, F. L., Met., Great Lakes Foundry Sand Co., United Artists Bldg., Detroit, Mich. (6-a-1, 6-c-1, 50-c)

Weaver, V. P., Asst. Met., American Brass Co., 414 Meadow St., Waterbury, Conn. (53-c-4)

Webster, Donald, Chem., American Laundry Machinery Co., 50 Sherer St., Rochester, N. Y. (50-p-8)

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Wine, W. C., Gen. Supt., Sibley Machine & Foundry Corp., 206 E. Tutt St., South Bend, Ind. (50-c)

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Wood, T. J., Asst. Supt., American Brake Shoe & Foundry Co., Mahwah, N. J. (50-t-4)

Woodliff, E. E., Harry W. Dietert Co., 9330 Roselawn Ave., Detroit, Mich. (4-e)

Woodward, R. C., Chief Met., Bucyrus-Erie Co., South Milwaukee, Wis. (51-c)

Wornom, A. H., Fdry. Training Instr., Newport News Ship Building & Dry Dock Co., Newport News, Va. (3, 3-c)

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Zahn, Charles, Fdry. Supt., Vilter Mfg. Co., 2217 S. 1st St., Milwaukee, Wis. (50-c)

Zemanek, R. J., U. S. Graphite Co., Saginaw, Mich. (50-t-2-c)

Ziebell, A. C., Pres. & Treas., Universal Foundry Co., Oshkosh, Wis. (4-a)

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Electric Furnace Melting—II

By A. G. Gierach, Chicago Heights, Ill.

In this, the last section of the author's papers, he takes into consideration furnace charging, selection of materials for charging, types of melting procedure, slagging, refining and other important furnace operations. The first section of this paper appeared in the August issue American Foundryman, and dealt with furnace bottoms, advantages of the electric furnace and other pertinent data on electric furnace melting. A. G. Gierach is works manager, American Manganese Steel Div., American Brake Shoe & Foundry Co., Chicago Heights, Ill.

CHARGING the furnace, when starting with a cold charge, was formerly a laborious project, and to some extent militated against the more universal early adoption of the electric process. Today this handicap has been overcome through the use of modified open hearth charging machines for the larger furnaces; and for the smaller units by removable roof modifications. All furnaces on the market today may be obtained with this latter convenience. It not only eliminates the drudgery and hardship imposed by hand charging, but it also effects savings in heat losses because of the shorter interval of time between heats.

Whatever the method employed, there are a few things to bear in mind in properly charging a furnace to obtain the best results and the maximum speed during the melt-down. Since the refining period is fairly constant for any given metal and operation, the melt-down and the time between heats determine the effective capacity or the tons which it is possible to produce.

A normal melt-down should proceed in such a manner that by the time the electrodes have bored through the charge, there should be a pool of sufficient size to prevent over-heating the bottom and causing it to come up. On the other hand, too compact a charge will retard melting and, in extreme cases, slugs of unmelted metal will remain in the bottom after a bath has formed. These can be removed only by over-heating the molten portion which always results in bad metallurgical problems and should be avoided at all times. Bridging is another situation which sometimes occurs. This is caused by criss-crossing too many long pieces in the upper part of the charge. About the only recourse one has here is to run up the electrodes and go into the furnace with heavy bars.

The best way to charge is to place the heavy pieces directly on the bottom. If only a few of these are available in a given charge, an attempt should be made to place them directly underneath the electrodes. The upper part of the charge should be comprised of the lighter and smaller pieces. When punchings are available, they may be used in proper proportions to obtain the proper texture. Hand charging has the one advantage that the scrap can be placed accurately in the furnace as outlined above. When charging boxes are used, the scrap is selected and so placed in the various boxes that approximately the same results are obtained as by hand charging.

Selection of Materials for Charge

All steel scrap for use in the electric furnace is purchased under specifications, both as to chemical content and size. For the acid process, and also for basic operation, when a one-slag method is being used on account of the necessity of preserving expensive alloys, the scrap necessarily must be down to certain limits in phosphorus and sulphur.

When the electric furnace was first placed on the market, those who introduced it made the mistake of recommending that cheap scrap could and should be used. Most likely this was done to offset the high power rates in effect at the time. It cannot be emphasized too strongly that in the electric furnace, the same as in any other melting unit, there is always a direct relation between what you put into a furnace and what you get out of it. For this reason, a great deal of care and discrimination should be used in selecting materials for the charge. It is advisable to use new scrap—that is, scrap which is entirely free from rust. If oxide is needed, the way to introduce it is in the form of a known amount of iron ore. Another essential for the metal charge and for all the alloys, as well as for all fluxes and slag-forming materials, is that they be absolutely free from moisture. Some operators go so far as to pre-heat all their materials before putting them into the furnace. The "bad boy" here, of course, is hydrogen.

Electrical Features

After the furnace has been properly charged, melting is ready to begin. In the original furnaces only one tap was available, and both the melting down and refining had to be carried out at this one voltage. This was usually a 90- to 100-volt tap, measured at no-load between phases. It was not very long, however, before a higher voltage tap became available for melting down and the original 90-volt tap was retained and used for refining. As more furnaces were sold, and the electrical engineers began to catch up with the wishes and requirements of the operators, it became apparent that a voltage working properly under a given set of conditions, would not necessarily be correct for another requirement. Today, therefore, with the advent of the multiple tap transformer, we have a flexible range of voltages

and power inputs, so that these can be varied at will for both melting down and refining. In the author's opinion, the introduction of this type of transformer is the outstanding achievement of the manufacturer since the innovation of the automatic control. With the present-day equipment, it can be stated truthfully that the operation is limited only by the refractories and the mentality of the melter.

Types of Melting Procedure

Two schools of melters exist today. One school aims to keep oxidation as low as possible during the melt-down. This group pays little attention to the history of the silicon during the operation. Their practice is to charge according to crucible process standards, and their aim is to hold the metal "flat." The second school pays special attention to the silicon content and the matter of a boil, at some time during or after the melt-down. The trend is toward the latter practice and a rather definite agreement now exists that it is better, and especially so in the acid process, that a low silicon prevail until the very last. The action seems to be two-fold. First, the action of the ore, causing a boil, will cleanse the metal of gases, because these are washed out by the evolved carbon monoxide. Second, it is borne out by experience that when the silicon is brought down low, the ability of the metal to hold gases in solution is reduced. Thus, there are two factors, both tending to set up a condition of low gas content, which is desirable. The result is that a metal is turned over to the shop that is able to withstand or overcome a wider range of variations in molding conditions, without evolving gas and producing porosity. Another advantage of such metal is that it is more fluid for any given temperature than metal which has been melted "flat."

To obtain low residual silicon and a boil it is necessary that the melt-down be carried on under partial oxidizing conditions, and it is usually advisable to add iron ore. The scrap, when it is rusty, carries its own oxide, and it is, therefore, more difficult to ascertain the correct amounts of ore to be added than when the scrap is clean. It is easier by far to introduce too much oxide rather than not enough. If the openings around the doors and tap holes do not fit tight, they should be sealed to decrease the variable of that portion of oxygen introduced through them.

Effect of Melt-Down Rate

The rate of melt-down also affects the oxidation. The shorter this period, the more definitely it may be controlled. The point to bear in mind is that a certain oxidation is to be achieved without having too great an excess of oxides in the bath, because these will have to be under control at the end, both as to amount and type.

Fig. 3—White hot castings being removed from heat treating furnace. Note how the men are dressed to aid them in withstanding the heat.

Slagging

At some time during the melt-down, flux for slag formation is added. In basic operation, this is usually burned lime or limestone, and in acid operation, it consists of sand. When the process is one that calls for more than one slag, the first slag usually is removed, approximately at the time of the melt-down. Slags introduced subsequently are usually made up of pre-determined mixtures. When the one-slag process is used, it is necesary to add slag materials of definite composition and at the critical moment, so that, at the melt-down, the slag has a consistency and is of such composition that it can be manipulated to achieve the desired results, both in the slag and the metal.

If it were possible to standardize an operation so that all procedures could be timed, the problem would become conceivably simpler, but this apparently cannot be done. If a controlled power input is presupposed, such variables as variation in the physical shapes and sizes of the charge, condition of the bottom, amount of patching previous to the heat, the variable wearing off of side walls and roofs, failure of mechanical or electrical equipment, and variations in voltage caused by the varying loads on the main supply line still exist. A complete shutdown for any reason for only 5 minutes compels a change in manipulation in the final period of reduction.

Refining

After the metal has all melted, sometimes a little sooner, and frequently a little later, power is switched to a lower voltage and the finishing period begins. This consists of so deoxidizing the metal and bringing it to such

a degree of temperature and fluidity that it will fill the requirements at hand.

Deoxidation with the ferroalloys is a precipitation process, and the products of the reactions are left in the metal as inclusions:

$$FeO + Mn = Fe + MnO$$
$$2FeO + Si = 2Fe + SiO_2$$
$$2MnO + Si = 2Mn + SiO_2$$

The number and characteristics of these inclusions will depend upon the amount of oxides present, and the state or condition of the metal when the ferro-alloys are introduced.

On the other hand, the deoxidation products, resulting from the use of a carbidic slag, are gases, and will pass off without having any deleterious effect upon the metal:

$$3FeO + CaC_2 = 3Fe + CaO + 2CO$$
$$3MnO + CaC_2 = 3Mn + CaO + 2CO$$

In foundry metal, fluidity is one of the first prime requisites, and higher metal temperatures prevail throughout. Foundry melters are not concerned with internal cleanliness to the same degree as the ingot group. It now has been thoroughly established, that a condition of the metal occurs where a further increase in temperature will cease to make the metal more fluid, but will actually make it less fluid.

Various explanations have been advanced for this behavior, practically all with the same conclusion. It has been found, as the various oxides in the metal are progressively reduced and the slag manipulated so that it goes from a dark hard to a disintegrating powder, and finally to a carbidic powder, that if the metal is held for any length of time under such a slag, corresponding to ingot practice, the fluidity, or the "runability," of the metal has been sacrified tremendously. It seems that it goes back to the axiom that the purer the metal, the higher its melting point. In practice, the presence of a small amount of oxide in the metal increases its fluidity. The amount should be neither small enough to cause sluggishness, nor large enough to disturb conditions during solidification and cause porosity in the castings.

One would naturally deduce, therefore, that the employment of a carbidic slag should be curtailed or probably discontinued altogether. In actual practice, this has proved to be the case. From these premises, the foundry melter must set up his methods of deoxidation. Instead of reducing the slag to extremely low oxygen content, practice is to work toward a slag that still will contain a certain definite amount of oxygen, and then to rely on the ferroalloys to complete the deoxidation of the metal. At the same time, it must be recognized that there is work to be done to recover alloys from the slag, and this part of the procedure must not be overlooked. In case the oxides are left in the slag in too great amounts, quality and physical properties suffer.

Oxide Content

In basic practice, it has been found that iron oxide contents of somewhere between 2.0 and 4.0 per cent give good all-around results. For acid practice, the oxygen content runs higher, and 10 to 14 per cent is not uncommon. Ferromanganese and ferrosilicon are the common deoxidizers. Although inclusions are not nearly so detrimental in this case, their menace is recognized, and a further deoxidation with a special deoxidizer usually is resorted to, either as the last item in the furnace, or in the ladle during or subsequent to tapping. These deoxidizers have for their chief purpose, in addition to their deoxidation values, the power to change the distribution of the non-metallics into wider and finer dispersions.

Government Wants Trained Men

AT THE REQUEST of the U. S. Civil Service Commission the following information, which deals with government requirements for trained men to fill important jobs is published.

It is hoped that, by securing men who have had industrial training, some of the difficulties encountered in the inspection of defense products by manufacturers may be eliminated and smoother operation of the defense machinery obtained.

"One of the most urgent needs is for industrial specialists, men with successful experience in manufacturing as managers, engineers, and research men. Right now there are several calls for men with factory or research experience in the fields of petroleum, metals, and furniture and floor coverings. Special emphasis is placed on a knowledge of industrial processes and methods. There is a scarcity of qualified persons and special emphasis is placed on eligibles for these positions.

"There are also calls for economists who can plan and conduct or assist in conducting research in business and economics, who can represent the employing agency in its relations with other Federal or State agencies, and who can supervise other professional and clerical workers. In the field of accounting there are numerous positions for those with training or experience in cost accounting.

"The salaries range from $2600 to $5600 a year. No written examination is required, but applicants must be able to show that they have had the required experience. Application blanks are available at any first or second class postoffices.

"An effort will be made not to 'cripple' defense industries by taking away important men in administrative or in technical positions. But the seriousness of the situation requires now that all available manpower be used as effectively as possible in the best interests of the country's defense.

"The Government wants men with experience in business; here is an oportunity for Industry and Government to work together on the many problems in the country's defense program."

Foundry Control Methods In Making Uniform Cast Iron—II

By E. K. Smith, Detroit, Mich.

The second section of this paper presented by the author, who is metallurgist, Electro Metallurgical Co., Detroit, Mich., deals with laboratory control methods concerning the use of microscope, importance of chemical analysis and Brinell testing. Ladle additions are discussed emphasizing the importance of structure control. The first installment of this article appeared in the August American Foundryman and the third and concluding installment will be published in a later issue. This paper was presented before the Regional Conference of the Southern and Northern California Chapters, May 22, during the Western Metals Congress.

Laboratory Methods

EVER since chemical analyses were introduced to the foundry years ago, they have had an undisputed place in the uniformity control of castings. The proportion of elements in the iron, coupled with other variables such as cooling rates, finally determines the quality of the castings. Regular chemical analyses are essential to the manufacture of uniform cast iron, but it may be emphasized that the speed in reporting the analyses is a vital factor in their usefulness. In some foundries no analyses are run and this often shows up sooner or later in lack of uniformity, usually insufficient strength or too great hardness. Where a laboratory is run in connection with the foundry, it is most important to have results reported to the foundryman in a minimum time, for every hour of delay in getting the result of analyses reduces their value. It is the belief of the author that it would be a good investment for many small foundries either to have a simple laboratory with one chemist, or to have analyses run by a commercial laboratory, which is in a position to report results promptly.

New Chemical Equipment

New developments in chemical analytical equipment provide very fast results. Such spectroscopic and combustion equipment is fairly expensive, and is suited for the larger foundries, but has paid for itself many times by promoting uniformity of castings. This is, of course, due to the fact that the analyses are reported so rapidly that any changes in composition can be made almost instantly. Two of these new types of equipment are reported in interesting detail by Zabel and Schuch[8] in *Iron Age*. In this laboratory a new type of combustion equipment is used, and carbon is reported in 3 minutes, while sulphur requires but 5 minutes. The balance of the elements are run by spectroscopic analysis. While the carbon and sulphur are being run by combustion, another part of the sample is subjected to the spectroscopic method and, at the expiration of 12 minutes, complete analyses are reported on silicon, manganese, nickel, chromium and molybdenum. After the equipment is once installed, the cost for running such rapid analyses is extremely low, provided that there is a considerable volume of samples.

Brinell

One quality of cast iron which is not simple to control is its hardness. Hardness varies with cooling rate (section size), composition and to other variables. As hardness gives a good indication of strength, and particularly of machinability, some rapid means of testing is required. Rockwell, Shore and Brinell tests are all used, but Brinell is thought to be more suitable, because of the large size of the impression, and the lack of homogeneity of cast iron. The Brinell machine is of great value, especially where many of the castings are machined.

Microscope

The microscope originally was used only for scientific research, but it is now a very valuable means of controlling and improving the quality of cast iron. At first microscopic analysis seems a little complicated, but actually it is extremely simple. It just goes a step further than the old fracture test, by which a former generation of foundrymen controlled their mixtures and castings, and did a very good job of it. The fracture test tells to the naked eye the fineness of grain and the color of a broken casting, and the microscope simply gives us more details of the structure; and, after all, it is the ultimate structure of the casting which determines its suitability for any type of service. With the microscope, it is possible to determine in a few minutes the structure of the casting. Obviously a casting containing coarse graphite and large patches of soft ferrite will not be as strong nor as resistant to abrasion as a casting which has very fine graphite with a pearlitic matrix.

A recognition of the value of the microscope in cast iron work will soon be published in the shape of a joint report from committees of the A.F.A. and A.S.T.M. on graphite classification. This very valuable work should be used as much by the gray iron foundryman as has been the grain size chart by the steel producer.

Ladle Additions

Chill Control

One of the leading foundry metallurgists recently stated that he tries to eliminate every variable in his raw materials and cupola operation, so the iron as it comes from the cupola shall be as uniform as it can possibly be made, and then he proceeds to get it really uniform by means of ladle additions. The production of alloyed iron by ladle additions of various alloys is widespread, but is outside the scope of this paper. At this time, only ladle additions for control of uniformity will be mentioned.

Simple forms of ladle additions for uniformity control are standard practice in many foundries today. Such additions, coupled with the chill test, are the backbone of uniformity control for cast iron. Fortunately, neither the chill test nor the ladle additions require any appreciable increase in cost of castings and, in fact, when one figures the considerable reduction in scrapped castings and the increase in machining speeds, these ladle additions are a very good investment. The standard method of control cited above is to make a chill from every ladle, then, if the chill is too high, add ferrosilicon or graphite or one of the new graphitizing alloys in the ladle. Ninety per cent ferrosilicon, preferably crushed to ¼ in. size, gives especially good results, as it dissolves almost instantly and gives out heat as it dissolves, thus making the iron hotter. This is particularly advantageous when the iron is on the dull side and has a high chill, as sometimes happens. The 90 per cent silicon addition brings the temperature of the iron up to normal pouring temperature and, at the same time, reduces the chill. The various types of graphite reduce the chill appreciably, but probably do not have the same effect on physical properties as does ferrosilicon. Some of the newer compound types of graphitizers have beneficial effect on physical properties and, at the same time, reduce the chill. If the chill is too low, add ferrochrome. The writer prefers the "Foundry Grade of Ferrochrome" crushed to 20 mesh size.

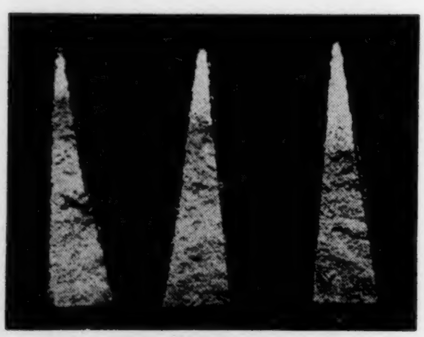


Fig. 3 — Illustrating uniformity control of cast iron through ladle additions. Left: Specimen treated with 0.30 per cent silicon. Center: Sample of base metal. Right: Specimen treated with 0.30 per cent chromium.

Fig. 3 illustrates uniformity control of cast iron by means of ladle additions. The center "V" test is the base metal. On the left is the same iron to which has been added 0.30 per cent silicon in the ladle, reducing the chill by half. On the right is the same base iron plus 0.30 per cent chromium added in ladle, raising the chill appreciably in this very light section. By proper ladle additions, the chill in the iron as it goes to the pouring floor will be substantially uniform.

Structure Control

Coarse Structure

As the structure of a casting determines its usefulness, it is important to always get the proper structure. Ladle additions have been found particularly suitable for such control work, and they are being used for this purpose in a number of foundries as regular procedure. Fig. 4 illustrates some ladle additions. On the left is a soft, coarse grained iron. On the right is shown exactly the same iron, plus a ladle addition of 0.50 per cent chromium. Note closing of grain, due to chromium.

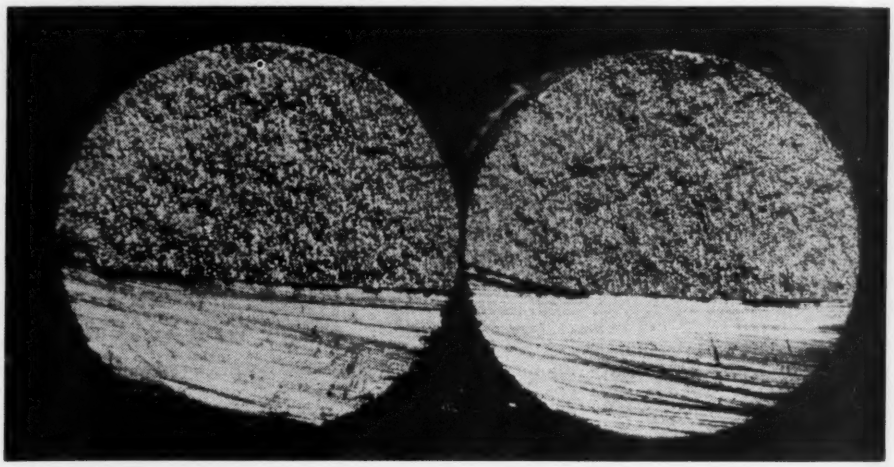


Fig. 4—The effect of ladle additions on metal structure. Left: Base metal; note the coarse grain structure. Right: Base metal after the addition of 0.50 per cent chromium. Note the closing of the grain structure.

Fig. 5 is the microstructure of the bar at the left in Fig. 4. The background, which shows gray, consists of alternate dark and light lines, or pearlite. This is the strong constituent in cast iron. The large black lines are graphite which, in this case, is rather coarse. The white areas adjacent to the graphite flakes are ferrite, which is soft and comparatively weak. This type of iron would be very unsuitable for either high strength or resistance to wear.

Fig. 6 illustrates the test bar at the right in Fig. 4. It will be noted that the graphite now is very much finer, and that the entire matrix is pearlitic. This iron would now be suitable for resistance to wear or raised temperatures. It also is much stronger than that shown in Fig. 5 due to change in structure, from addition of 0.50 per cent chromium.

To this was added 0.55 per cent chromium, the final analysis for chromium in the bar shown on the right hand side (Fig. 4) being 0.53 per cent. The net addition of 0.50 per cent chromium effected the changes in structure and microstructure illustrated.

Table 3

Analysis of Base Metal of Fig. 4

Silicon, per cent	2.30
Sulphur, per cent	0.098
Phosphorus, per cent	0.268
Manganese, per cent	0.60
Total carbon, per cent	3.55
Chromium, per cent	0.03

Weak Structure

Another type of structure which is very undesirable in most castings is that consisting of long pine tree shapes or dendrites. Fig. 7 shows the graphite formation in such an iron.

The long thin dendritic forms set up planes of weakness, and such irons have a strong tendency to crack while cooling or, possibly, to break while in service. This type of structure can be easily eliminated by a ladle addition. A number of the complex alloys of silicon, manganese, chromium and zirconium and other elements can be used effectively for this purpose. However, in many cases, the simple addition of ferrosilicon will accomplish the desired result, as is shown in Fig. 8.

Fig. 8 shows the graphite structure of the same iron shown in Fig. 7 with the addition of 0.20 per cent of silicon in the ladle. By comparing the structure of Fig. 7 and Fig. 8, it is obvious that the iron in Fig. 8 will be far more resistant to shock and stronger than that in Fig. 7.

(To Be Continued)

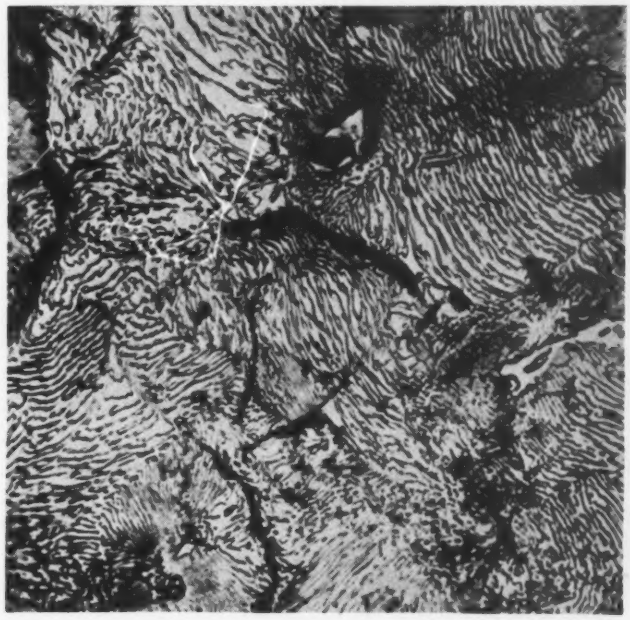


Fig. 5 (left)—Microstructure of base metal test bar shown at the left in Fig. 4. Fig 6 (right)—Microstructure of base metal to which chromium was added shown at the right in Fig. 4. Etched with nital. 1000x.

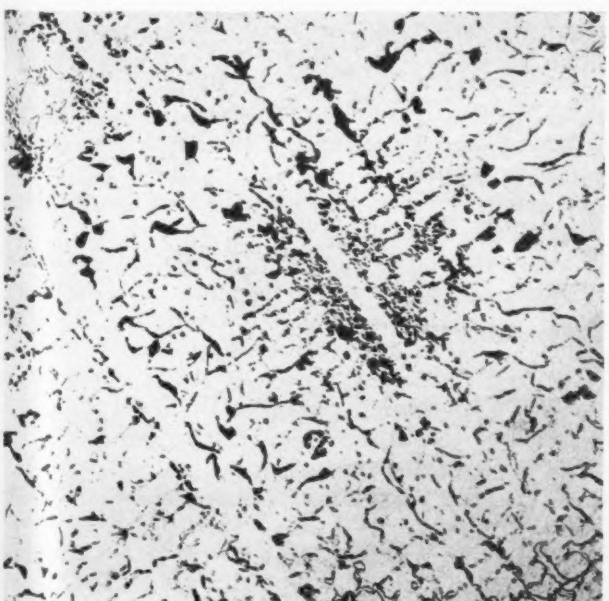


Fig. 7 (left)—Example of an undesirable structure in some castings—a dendritic structure. Fig. 8 (right)—Same as seen in Fig. 7 except with a 0.20 per cent silicon addition. Unetched. 100x.

NEW MEMBERS

(July 23 to August 20, 1941)

Conversions

Sustaining from Company

Detroit Gray Iron Foundry Co., Detroit, Mich. (Hugh Martin, Pres.)

Company from Personal

Vulcan Steel Foundry Co., Oakland, Calif. (John Nazro, Mgr.)

Anderson Foundry Co., Bayport, Minn. (E. C. Madson, Supt.)

Canadian Section

A. Jack Moore, Supt., Montreal Bronze, Ltd., Montreal, Que., Canada

Central Indiana Chapter

Preston B. Fisher, Swaye, Robinson Co., Richmond, Ind.

Leon C. Thompson, Sec'y-Treas., Thompson Bros. Pattern Works, Indianapolis, Ind.

Walter Wingenroth, Cost, Time and Motion Study Dept., National Malleable & Steel Castings Co., Indianapolis, Ind.

Chicago Chapter

Louis John Crosoli, Prod. & Cost Clerk, International Harvester Co., Tractor Works, Chicago, Illinois

A. G. Gierach, Works Mgr., American Manganese Steel Div. of American Brake Shoe & Foundry Co., Chicago Heights, Ill.

S. R. Rapp, A. G. J. Rapp Co., Chicago, Ill.

Lawrence C. Wickliffe, Foreman, American Steel Foundries, East Chicago, Ind.

Detroit Chapter

Henry D. Lampman, Metallurgist, Detroit Gray Iron Foundry Co., Detroit, Mich.

Metropolitan Chapter

Herbert Brecht, Fdy. Supt., Night Shift, Eclipse Aviation Div., Bendix Aviation Corp., Bendix, New Jersey.

William R. Jewett, Plt. Layout Engr., Eclipe Aviation Div., Bendix Aviation Corp., Bendix, N. J.

Northeastern Ohio Chapter

Wm. Seubert, Patt. Foreman, National Malleable & Steel Castings Co., Cleveland, Ohio

Northern California Chapter

George McDonald, H. C. Macaulay Foundry Co., Berkeley, Calif.

George Silverfoote, H. C. Macaulay Foundry Co., Berkeley, Calif.

Percy Williams, Brass Fdry. Foreman, Enterprise Engine & Foundry Co., San Francisco, Calif.

Ontario Chapter

*The Frost & Wood Co., Ltd., Smiths Falls, Ontario, Canada (William Ross, Fdry. Foreman)

Sam C. Kearns, Metallurgist, McKinnon Industries, Ltd., St. Catherines, Ontario, Canada

William A. McIntyre, Ass't Metallurgist, McKinnon Industries, Ltd., St. Catherines, Ontario, Canada

Southern California Chapter

Jake Blasco, Utility Electric Steel Foundry, Los Angeles, Calif.

John William Larsen, Cleaning Room Foreman, Pacific Gas Radiator Co., Los Angeles, Calif.

L. M. Nash, Supt., Magnesium Products, Inc., Los Angeles, Calif.

Ralph E. Shayne, Fdry. Gen. Foreman, Pacific Gas Radiator Co., Huntington Park, Calif.

Wisconsin Chapter

Paul M. Collins, Sales Promotion, Chase Co., Waterbury, Conn.

Earl Dicks, Gen. Core Room Foreman, Nash Motors Co., Div. of Nash Kelvinator Corp., Kenosha, Wis.

Arthur R. Drichta, Coremaker, Allis-Chalmers Mfg Co., Milwaukee, Wis.

William Alfred Eckhart, Sand Lab., Research Dept., Allis Chalmers Mfg. Co., Milwaukee, Wis.

James J. Ewens, Supt., Milwaukee Steel Foundry Co., Milwaukee, Wis.

Arthur L. Grede, Vice Pres. & Sec'y, Grede Foundries, Inc., Wauwatosa, Wis.

Robert Hintz, Metallurgist, Allis Chalmers Mfg. Co., Milwaukee, Wis.

Wm. Hughes, Gen. Fdy. Foreman, Nash Motors Co., Div. of Nash Kelvinator Corp, Kenosha, Wisconsin

Harold W. Ruf, Personnel Director, Grede Foundries, Inc., Wauwatosa, Wis.

R. B. Simmons, Div. Supt. (Fdry.) Nash Motors Co., Div. of Nash Kelvinator Corp., Kenosha, Wisconsin

Gus Spara, Cleaning Foreman, Nash Motors Co., Div. of Nash Kelvinator Corp., Kenosha, Wis.

Outside of Chapter

Armando Lodeiro Blanco, Buenos Aires, Republica Argentina

T. J. Barry, Repr., United States Hoffman Machinery Corp., Pittsburgh, Pa.

Andrew J. Black, Ass't Supt., Atlantic Gulf & Pacific Co. of Manila, Manila, P. I.

*Darbyshire Harvie Iron & Machine Co., El Paso, Texas (M. S. Darbyshire, Vice Pres.)

William J. Donnelly, Supt., Atlantic, Gulf & Pacific Co. of Manila, Manila, P. I.

*Pittsburgh Steel Foundry Corp., Glassport, Pa. (G. A. Hassel, Pres.)

A. E. Hughes, Gen. Mgr., Hume Pipe (Far East), Ltd., Singapore

Luiz Dumont Villares, Pirie, Villares & Cia, Ltda., Sao Paulo, Brazil

William T. Winder, U. S. Navy Yard, Charleston, South Carolina

*Company

Report of Steel Division Committee on Impact Testing

The following committee report was presented at a steel session during the 45th Annual A.F.A. Convention, New York, N. Y., May 15, 1941. The report gives the results of an investigation suggested by the committee in 1940, namely, that test coupons be cast attached to a strut casting at various locations and that impact test specimens should be prepared from the coupons to check the impact properties of cast steel at various locations on the casting.

Mr. Chairman and Members of American Foundrymen's Association:

AT the meeting of the Steel Division Advisory Committee, held during the convention in Chicago, Ill., May, 1940, your chairman stated he believed the Steel Division Committee on Impact Testing should be disbanded as the work of this committee seemed to be pointing toward the establishment of impact test methods, which work is being carried on efficiently by the American Society for Testing Materials.

At the request, however, of the Advisory Committee and particularly the chairman, John Howe Hall, it was decided to appoint a new Impact Testing Committee, whose function would be merely fact-finding. They were to report at the convention this year whatever information had been developed in impact testing on steel castings. Therefore, the following committee was appointed:

R. A. Gezelius, General Steel Castings Corp., Eddystone, Pa.
W. C. Harris, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa.
D. F. Sawtelle, Malleable Iron Fittings Co., Branford, Conn.
H. F. Taylor, Naval Research Laboratory, Washington, D. C.
E. C. Troy, Dodge Steel Co., Philadelphia, Pa.
L. C. Wilson, *Chairman*, Reading Steel Castings Div., American Chain & Cable Co., Inc., Reading, Pa.

Your chairman has received information from most members of the committee that they have found nothing of importance to report to this convention. However, due to the cooperation and work of Commander J. J. Twomey, laboratory officer, Brooklyn Navy Yard, and his organization; W. C. Harris, Birdsboro Steel Foundry and Machine Co.; H. F. Taylor, Naval Research Laboratory; and Werner Finster, Reading Steel Casting Div., American Chain & Cable Co., Inc., we were able to carry out tests requested at the 1939 Cincinnati convention. This dealt with the impact strength of a strut casting and also a test on a smaller casting in order to compare, if possible, results with those obtained on the large strut casting. To these men I wish to give the thanks of the committee and the American Foundrymen's Association for their efforts.

Definite conclusions cannot be drawn from one or even two tests, but the results of both of these tests are submitted herewith for whatever bearing they may have on impact testing of steel castings.

During the discussion of the A.F.A. Impact Committee at Cincinnati in 1939 on impact testing and impact properties of cast steel and the application of impact values to steel castings, it was decided, following a suggestion by W. J. Jeffries, then with the U. S. Navy, that test coupons be cast attached to a strut casting at various locations and that impact test specimens should be prepared from these coupons to check the impact properties of cast steel at various locations on the casting.

William Harris, metallurgist, Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., offered to attach coupons to a strut casting for this test and N. A. Kahn, metallurgist, materials laboratory, Brooklyn Navy Yard, expressed his willingness to arrange for testing of the impact specimens.

8 Test Coupons Cast to Strut

Six test coupons were cast attached in the horizontal position to the arms of the strut both on the inside and on the outside of the two arms, at the end of the strut arms as well as adjacent to the barrel section of the strut. Also two test coupons were cast in a vertical position attached to the barrel. Both the arm and the barrel sections to which the test coupons were attached were approximately 3-in. thick.

Chemical Composition

The strut, which weighs approximately 25,000 lb., was cast from a heat which had the following chemical composition:

C—0.25 Mn—0.54 Si—0.48
P—0.32 S—0.28

Heat Treatment

The following heat treatment was given to the strut casting:

The furnace charge containing the strut was brought to 1650°F. in 8 hr., held at 1650°F. for 8 hr. and furnace cooled in 12 hr.

Tests Results

After the heat treatment, tensile test specimens were prepared from 2 test coupons cast horizontally attached to the arms and from one of the 2 test coupons cast attached vertically to the barrel. The results of the tensile tests on these 3 specimens are shown in Table 1.

It will be noted that the tensile properties check very closely for the three test specimens

Table 1
Average Physical Properties of Specimens Tested

	Specimens 1	2	3
Tensile Strength, lb. per sq. in.	70,800	70,400	71,000
Yield Point, lb. per sq. in.	37,500	37,400	37,550
Elongation in 2-in., per cent	29.5	30.0	28.0
Reduction of Area, per cent	48.0	48.0	49.0

taken from three different locations on the casting.

At the Cincinnati meeting, it was suggested that tensile impact specimens be used. However, just prior to the tests, Commander J. J. Twomey suggested that Charpy impact specimens be submitted along with the tensile impact specimens. Owing to the fact that the coupons cast on the strut were not sufficiently large to obtain Charpy impact specimens of a size 1.182-in. square and 6-in. long, as requested, it was only possible to furnish the tensile impact specimens and these are the only tests we were able to obtain.

Table 2

Results of Impact Tests on Five 2-Inch Steel Specimens

Bar No.	L_t *in.*	L_0 *in.*	D_0 *in.*	L_f *in.*	D_f *in.*	*Elongation in 2-in., Per Cent*	*Reduction of Area, Per Cent*	*Energy Ft. lbs.*
1	5⅝	2	0.394	2-43/64	0.272	33.5	52.2	540
2	5½	2	0.393	2-43/64	0.276	33.5	51.0	520
3	5⅝	2	0.395	2-37/64	0.283	28.8	48.4	455
4	5⅝	2	0.395	2-42/64	0.274	32.8	51.6	505
5	5½	2	0.394	2-42/64	0.274	32.8	51.6	510

L_t—Length of test bar. L_0—Gauge length. D_0—Original diameter. L_f—Gauge length after test. D_f—Diameter after test.

The tensile impact specimens machined to a 2-in. gauge length of 0.394-in. ± 0.001-in. diameter, had a 1/64-in. radius at the junction of the 0.394-in. threaded ends. The tensile impact tests were conducted at the materials laboratory, United States Navy Yard, New York City, through the courtesy of Commander J. J. Twomey, U. S. N., on approval of the tests by the Bureau of Ships. The tests were made on an impact machine with a pendulum energy of 1,000 lb. at a temperature of 62°F. The results shown in Table 2 were obtained.

In submitting the results of the test, Commander J. J. Twomey commented that the results obtained were only slightly lower than the value of 525 ft. lbs. usually obtained for medium carbon steel.

As we have only this one test available, no conclusion can be drawn. Also, as the type of casting involved cannot be heat treated except by full annealing under the U. S. Navy Specifications to which it was made and also due to its design, no comparison on the influence of heat treatments other than full annealing on the impact properties of cast steel coupons attached to strut castings can be obtained.

Comments on Tests

However, we do believe that the results obtained permit the following comments:

1. The tensile properties obtained on three test specimens from three different locations were very uniform, indicating that little variation in chemical composition could have existed throughout the casting, also that the casting was very uniformly heat treated.
2. Very uniform elongation and reduction of area results were obtained on the 4 tensile impact test specimens which had been cast in the horizontal position, namely, specimens 1, 2, 4 and 5. The lowest elongation on these 4 specimens was only 0.7 per cent lower than the highest elongation, i. e., was only 2.1 per cent less than the highest elongation value. The lowest reduction of area was only 1.2 per cent less than the highest result or only 2.3 per cent less than the highest reduction of area value. The average tensile impact strength of these 4 specimens ran between 505 and 540 ft. lbs., with an average impact strength of 519 ft. lbs., and the lowest impact value 6.5 per cent lower than the highest value.
3. The results obtained on tensile impact specimen No. 3 which had been prepared from the coupon cast attached in the vertical position are lower than any on the bars cast in the horizontal position. Elongation is 4.7 per cent lower than the highest elongation on horizontally cast bars or 14 per cent lower than the highest elongation value. On reduction of area, the results are lower by 3.8 per cent and 7.3 per cent respectively. The tensile impact strength of 455 ft. lbs. is 12.3 per cent lower than the average tensile impact strength of the bars cast horizontally.
4. While as stated above, no conclusions can be drawn from one test, there is an indication in the results obtained that the manner in which the test coupons are cast attached to the castings may influence the results of the impact tensile test to a greater extent than the results of the tensile test.

Because of W. J. Jeffries' suggestion at the Cincinnati meeting, the above test results were referred to him and we appreciate the interest he has taken in going over the report as indicated by the following comments:

"The impact properties shown by the specimens are much better than I expected to find. The uniformity in various sections of the strut is very gratifying; however, the static tensile properties are certainly more uniform than the impact properties, indicating to me that there is greater sensitivity exhibited by the impact characteristics of the casting than is shown by the static tensile test.

"With the limited amount of data available, I feel that the impact test can be relied upon to afford greater sensitivity in judging the physical characteristics of a casting of the type tested. The same may not hold true with more massive types of castings. It would, therefore, be of interest to not only repeat the test on another casting of a similar type, but also to make a tensile impact test of a casting more generally massive.

"I think, however, that the result obtained has justified the work done and affords information not heretofore available in the technical press. I appreciate your affording me an opportunity to review this work, and

Table 3

Chemical and Physical Properties of Charpy Impact Specimens

Analysis, Percent					*Mechanical Properties*			
C.	*Mn.*	*Si*	*P.*	*S.*	*Tensile Strength, Lb. Per Sq. In.*	*Yield Point, Lb. Per Sq. In.*	*Elongation In 2-In. Per Cent*	*Reduction of Area, Per Cent*
0.24	0.70	0.30	0.026	0.036	72,100	43,600	27.0	45.8

trust that the American Foundrymen's Association will be inclined to do further work along this line."

Tests on Sections From Castings

The tests conducted by Howard F. Taylor, Naval Research Laboratory, Washington, D. C., differed from the experiment mentioned in that Charpy key-hole notched specimens were employed which had been cut from sections of a casting instead of having been prepared from test coupons cast attached to a casting, as was the case with the strut casting discussed.

The casting from which the Charpy key-hole notched impact specimens were machined was a welding end 6-in. 1500 lb. gate body casting made to A. S. T. M. Specification A-216 Grade WCB. Chemical analysis and physical properties of the heat from which the body was poured were as given in Table 3.

Table 4

Average Impact Test Results Obtained by Taylor

Specimens Marked Nos.	*Impact Charpy Key-Hole Ft. Lb.*
1	18¾
2	19
3	18
4	23
5	24

Thirteen impact specimens were machined from the body. Two specimens each marked Nos. 1 and 3 were taken from the welding ends, which had 2-in. wall thickness; three specimens marked No. 2 were taken from the side wall of the gate body adjacent to the guide ribs for the wedge; three specimens marked No. 4 were taken from a 2-in. wall section underneath the bonnet flange and three specimens marked No. 5 were taken from the center of the bonnet flange itself, which had a 4¼-in. cross section.

The average impact results obtained by Mr. Taylor for each group of specimens were as given in Table 4. It will be noted that the impact test results obtained on the specimens taken from the welding ends (Nos. 1 and 2) and the body adjacent to the guide rib (No. 3) check very closely and that specimens No. 4 taken from the 2-in. wall underneath the bonnet flange gave in this case a higher impact strength, just as the specimens No. 5, which had been taken from the center of the bonnet flange which represented the heaviest section of the casting, were also higher than specimens Nos. 1, 2 and 3.

While it could be expected that specimens taken from the 2-in. section should have higher impact properties than specimens taken from the 4-in. section, the result as mentioned showed the highest impact values for the specimens taken from the heaviest section.

Time did not permit to check into the microstructure of all five groups of test specimens to gain an explanation for the variation of results obtained and the data are included in this report only to bring out that results as obtained by impact testing will show variation at different locations in the same casting.

In his contribution to the work of the Steel Division Committee on Impact Testing, Howard F. Taylor stated that he had checked the literature quite thoroughly and could find no recently published work on the impact testing of cast steel.

Based on work which at present is being carried out in several projects at the Naval Research Laboratory, experiments with various impact test specimens has shown that the vee-notched specimens are more sensitive to variations than the key-hole notched specimens and indications exist that the vee-notched specimens may be more sensitive than needed for castings. However, this work is still in the unfinished state.

Importance of Test Temperatures

The series of tests conducted at the laboratory have brought out the importance of the test temperature which greatly influences the results obtained. On tests conducted by C. E. Jackson on plates, "as rolled" and "welded plates" using vee-notched Charpy impact specimens, the results shown in Table 5 were obtained.

These results show a very steep rise in impact test values using a Charpy vee-notched specimen over a temperature range from 40 to 100°F., which temperature range, while wider than would occur in temperatures prevalent in testing laboratories throughout the year, still brings out the importance that temperatures at which the tests were performed should be stated in connection with impact tests.

Your chairman would like to comment that the above experiments further emphasize the need for a great deal of research work and information on impact test values of castings before minimum impact test values should be written into general steel casting specifications.

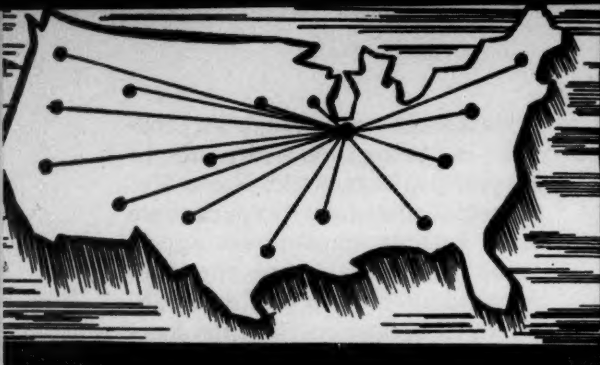
Respectfully submitted for the committee,

L. C. Wilson, *Chairman.*

Table 5

Results Using Vee-notched Charpy Impact Specimens On Plates "As Rolled" and "Welded"

Test Temperature, °F.	*Plate*	*Charpy Impact, Ft. Lb.*
40	"as rolled"	35
40	welded	45
75	"as rolled"	98
75	welded	110
100	"as rolled"	128
100	welded	122



Chapter Activities

Wisconsin Chapter Opens Season With Super-Successful Party

By Geo. K. Dreher,* Milwaukee, Wis.

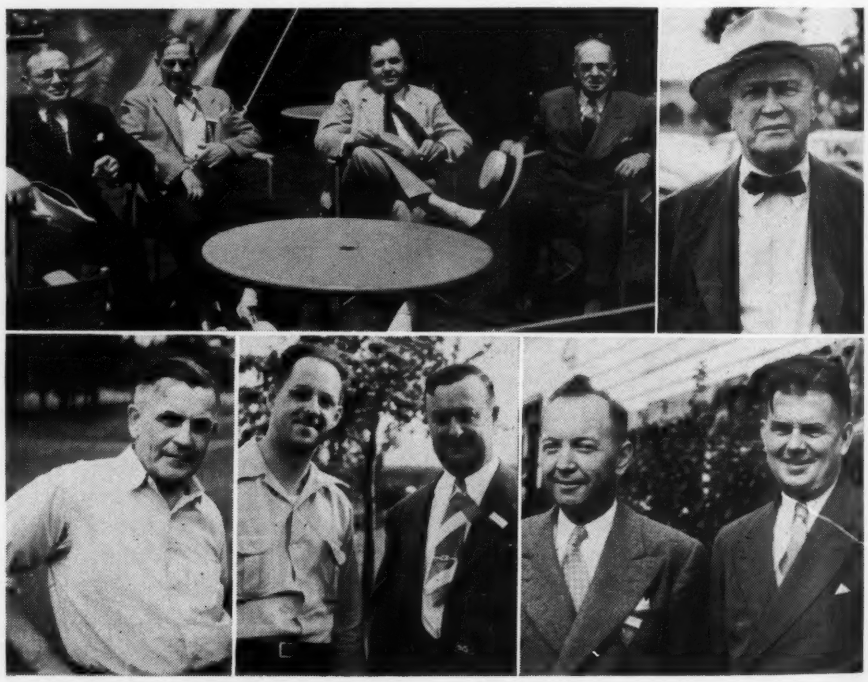
A.F.A. events of the Wisconsin Chapter roster for 1941-1942 got away to a 155 mm. start under the guidance of Chapter President Art Ziebell, Oshkosh, Wisconsin, on the occasion of the annual golf party held on Friday, July 18, at the Ozaukee Country Club.

Outing chairman, Seward Shaver, and his co-chairman, Don Stephens, lined up one of the most smoothly run parties which the Wisconsin Chapter has had the privilege to attend. Golfers numbering about 200 marched over the fairways, dodging in and out of thunder squalls during most of the afternoon. None gave up the ship, however, and all came off the 18th green ready for the balance of the program.

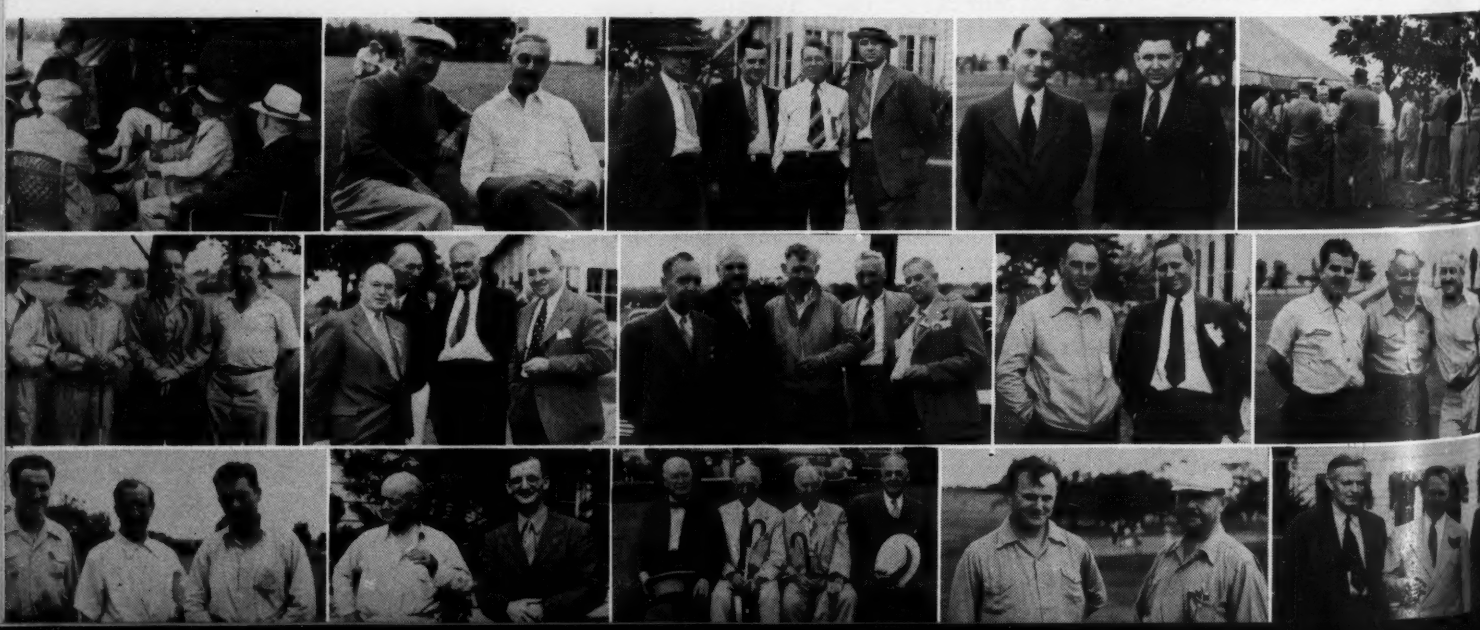
Arrangements for a second shift at the dining table were necessary because of the large crowd. When all was said and done, over 550 members and guests were served a delicious dinner.

*Ampco Metals Co., and Secretary, Wisconsin Chapter.

The evening program moved into high gear shortly after 8:00 p. m. with a short talk by President Art Ziebell, who also awarded the chapter trophy for the day's low gross golf score to A. J. Emanuel, who scored a 76. The microphone was then turned over to Past President Ben Claffey, who had the honor of awarding the National A.F.A. President Simpson's trophy. Poetic justice and good luck of the draw gave this beautiful trophy to Bill Bornfleth, a Past President. Numerous other prizes were awarded. An excellent floor show wound up the evening. No one knows at what time the last foundrymen returned to his molds and flasks.



Above and Below—The Wisconsin Chapter had a record shattering crowd for their annual outing at the Ozaukee Country Club.
(Photos courtesy John Bing, A. P. Green Fire Brick Co.)



Purdue Regional Foundry Conference Plans Form

By Erle Ross,* Chicago, Ill.

THE fast-moving pace of the national defense program, bringing with it a heavy demand for castings and severe shortage of essential raw materials, is posing numerous problems before the foundry industry. Solutions to these problems, which must be found if armament production is to go forward and if civilian needs are not to be too seriously curtailed, profoundly affect foundry operations.

Thus, the regional foundry conference to be held at Purdue University, West Lafayette, Ind., Oct. 17-18, will have its program geared to these current, all-important questions. The conference will be sponsored by the Chicago, Michiana and Central Indiana chapters of the American Foundrymen's Association, in co-operation with the engineering school of the university. Last previous conference was conducted in the fall of 1938 under joint auspices of the Chicago chapter and the university.

The program for the conference is being arranged to appeal to foundry managers, supervisors, metallurgists, foremen, shopmen and others in the Indiana-Illinois territory interested in improved foundry practice, particularly as it is affected by today's rapidly changing conditions. The four major foundry divisions—steel, gray iron, malleable and nonferrous—will conduct separate group meetings comprising morning and afternoon sessions on each of the two days. In addition, a general interest dinner-meeting is scheduled for the evening of the first day, this to take place of the regular October meetings of the three chapters.

Committees have been organized for some time and are now arranging programs for the four divisions. Members of a general committee, representing the Chicago, Michiana and Central Indiana chapters of the A.F.A., met at Purdue, April 11-12, with representatives of the university, to arrange preliminary details of the conference.

Friday morning simultaneous sessions of the steel, gray iron and malleable divisions will be devoted to the subject: "Substitution in Raw Materials Because of Shortages." Afternoon sessions of the same groups will give attention to: "Effect on Melting Practices Due to Substitutions of Materials Because of Shortages." Friday sessions of the nonferrous division and Saturday sessions of all divisions will deal with topics of particular and timely interest to those groups.

The gray iron division has developed its program almost completely. Speaker at the Friday morning session on "Substitutions in Raw Materials for Melting Because of Shortages" will be M. J. Gregory, factory manager, foundry division, Caterpillar Tractor Co., Peoria, Ill., with Arthur Klopf, foundry manager, Hansell-Elcock Co., Chicago, as technical chairman. Dr. James T. MacKenzie, chief metallurgist, American Cast Iron Pipe Co., Birmingham, Ala., will speak at the Friday afternoon session on "Effect on Melting Practices Due to Substitutions of Materials Because of Shortages", with R. F. Hine, foundry metallurgist, Studebaker Corp., South Bend, Ind., as technical chairman.

At the Saturday morning gray iron session, Elmer J. Carmody, foundry engineer, Charles C. Kawin Co., Chicago, will speak on "Modern Methods of Gating and Risering." M. J. Lefler, manager, Western Foundry Co., Chicago, will preside as technical chairman. W. G. Reichert, general foundry metallurgist, American Brake Shoe & Foundry Co., Mahwah, N. J., will speak on "Factors Affecting Surface Finish of Castings." R. L. McIlvaine, foundry engineer, National Engineering Co., Chicago, will be technical chairman.

The nonferrous division will take "Melting of Nonferrous Metals to Meet Physical Properties and Specifications" for the topic of its Friday morning session, with W. B. George, metallurgist and foundry engineer, R. Lavin & Sons., Chicago, as speaker. Harry W. Dietert, president, Harry W. Dietert Co., Detroit, will address the Friday afternoon session on "Core Practices and Molding Sands for Nonferrous Castings." Robert Langsenkamp, sales manager, Langsenkamp - Wheeler Brass Works Inc., Indianapolis, will serve as technical chairman.

"Aluminum and Magnesium Foundry Practice" will be the nonferrous division's subject for Saturday morning, with speaker still to be announced. Technical chairman will be G. E. Stoll, metallurgist, Bendix Products Division, Bendix Aviation Corp., South Bend, Ind. Saturday afternoon session will deal with

Michael Golden Shops, Purdue University, which houses the foundry department.

*The Foundry, and Secretary, Purdue Regional Conference Committee.

Groups of Wisconsin Chapter members and guests at the Chapter's annual outing.
(Photos courtesy John Bing, A. P. Green Fire Brick Co.)

"Gates and Risers for Nonferrous Castings," with W. B. George again the speaker, and Mr. Langsenkamp the technical chairman.

Plans for the Steel and Malleable divisions have not advanced to the point where details can be announced. However, it is known that J. H. Lansing, shop practice engineer, Malleable Founders' Society, Cleveland, will be a speaker at a malleable session on "Cleaning of Castings."

In addition to the divisional sessions, a special feature of the conference will be a student meeting at which a prominent member of the foundry industry will speak on "Properties and Uses of Castings in Industry." This meeting, to be arranged in co-operation with university representatives, will be held at such time and place as will promote attendance of students.

Dinner meeting, to be in the Memorial Union building, as will all sessions of the conference, is being arranged by the Central Indiana chapter and will be devoted to "Employer - Employe Relations." Principal speaker has not yet been announced, but he will be a well-known industrial executive of wide experience on the subject. Brief addresses also will be made by representatives of the university and chairmen of the three A.F.A. chapters. It is expected that the dinner will be widely attended by chapter members and Indiana foundrymen.

General committee arranging the conference is as follows: *Chairman,* J. D. Burlie, foundry engineer, Western Electric Co., Chicago; *Vice chairman,* R. L. McIlvaine, foundry engineer, National Engineering Co,. Chicago; *Secretary,* E. F. Ross, Chicago editor, *The Foundry,* Chicago; L. C. McAnly, superintendent, Rockwood Mfg. Co., Indianapolis; L. H. Rudesill, metallurgist, Griffin Wheel Co., Chicago; G. B. Stantial, foundry superintendent, Illinois Malleable Iron Co., Chicago; G. P. Phillips, chief metallurgist, automotive foundry division, International Harvester Co., Chicago; E. C. Bumke, superintendent, malleable division, Oliver Farm Equipment Co., South Bend, Ind.; W. A. Schlosser, superintendent, Argos Foundry Co., Plymouth, Ind.; W. A. Knapp, assistant dean of engineering, Purdue University; J. W. Bray, head, school of chemical and metallurgical engineering, Purdue University; C. W. Beese, head, department of general engineering, Purdue University; and chairmen of the four divisional and several other subcommittees.

Steel division committee is: *Chairman,* A. W. Gregg, foundry engineer, foundry equipment division, Whiting Corp., Harvey Ill.; R. A. Thompson, Electric Steel Castings Co., Indianapolis; A. G. Gierach, works manager, American Manganese Steel Division, American Brake Shoe & Foundry Co., Chicago Heights, Ill.; H. E. Orr, sales engineer, Vanadium Corp. of America, Chicago; H. Klouman, vice president, Michiana Products Corp., Michigan City, Ind.; B. J. Aamodt, National Malleable & Steel Castings Co., Cicero, Ill.; H. A. Forsberg, general superintendent, Continental Roll & Steel Foundry Co., East Chicago, Ind.

Gray Iron division committee: *Chairman,* H. W. Johnson, superintendent, Northwestern Foundry Co., Chicago; L. C. McAnly, superintendent, Rockwood Mfg. Co., Indianapolis; G. P. Phillips, chief metallurgist, automotive foundry division, International Harvester Co., Chicago; R. F. Hine, foundry metallurgist, Studebaker Corp., South Bend, Ind.; W. A. Schlosser, superintendent, Argos Foundry Co,. Plymouth, Ind.; Arthur Klopf, foundry manager, Hansell-Elcock Co., Chicago; M. J. Lefler, manager, Western Foundry Co., Chicago.

Malleable division committee: *Chairman,* B. E. Gavin, plant engineer, National Malleable & Steel Castings Co., Indianapolis; L. H. Rudesill, metallurgist, Griffin Wheel Co., Chicago; G. B. Stantial, foundry superintendent, Illinois Malleable Iron

F. A. Mainzer

Co., Chicago; E. C. Bumke, superintendent, malleable division, Oliver Farm Equipment Co., South Bend, Ind.; J. H. Lansing, shop practice engineer, Malleable Founders' Society, Cleveland.

Nonferrous division committee: *Chairman*, George E. Stoll, metallurgist, Bendix Products division, Bendix Aviation Corp., South Bend, Ind.; Robert Langsenkamp, sales manager, Langsenkamp-Wheeler Brass Works Inc., Indianapolis; W. B. George, metallurgist and foundry engineer, R. Lavin & Sons, Chicago; Clifford McKelvey, superintendent brass foundry, Chicago Hardware Foundry Co., North Chicago, Ill.; J. D. Burlie, foundry engineer, Western Electric Co., Chicago.

Joint chapter dinner committee: *Chairman*, H. B. Harvey, president, Indiana Foundry Corp., Muncie, Ind., and members of program committee Central Indiana chapter.

Student meeting committee: *Chairman*, C. E. Westover, executive vice president, American Foundrymen's Association, Chicago; J. W. Bray, head, school of chemical and metallurgical engineering, Purdue University; C. W. Beese, head, department of general engineering, Purdue University; H. L. Solberg, head, school of mechanical engineering, Purdue University; E. S. Ault, professor of machine design, Purdue University; R. E. Wendt, foundry instructor, Purdue University.

H. L. Detro

Northern California Visits Photographer

UNDER the urging of the genial secretary-treasurer of the Northern California Chapter, several of the officers and directors of that chapter were persuaded to visit the photographer and, as a result, the chapter

G. L. Kennard

board is introduced to our Association. The chapter is quite proud of its board of directors and chapter officers and cordially invites members from other chapters, visiting the Pacific coast, to attend one of their meetings and meet them. The officers and directors are:

Chairman—E. M. Welch, works manager, American Manganese Steel Div., Oakland

Vice-Chairman—F. A. Mainzer, manager, Pacific Brass Foundry, San Francisco

Secretary - Treasurer — G. L. Kennard, secretary, Northern California Foundrymen's Institute, San Francisco.

P. C. Valentine

Directors—John S. Fowler, secretary, Pacific Foundry Co. San Francisco

James L. Francis, Vulcan Foundry Co., Oakland

Ben C. Page, superintendent, F. K. Simonds Co., Berkeley

P. C. Valentine, sales manager, Del Monte Properties Co., San Francisco

Howard I. Detro, manager, American Radiator and Standard Sanitary Corp., Richmond

I. L. Johnson, president, Pacific Steel Casting Co., Berkeley

S. D. Russell, president, Phoenix Iron Works, Oakland

Richard Vosbrink, proprietor, Berkeley Pattern Works, Berkeley

It is to be regretted that Secretary Kennard could not get pictures of Chairman Welch, and Directors Fowler, Francis and Page at this time but their pictures are promised later.

R. Vosbrink

NEW CHAPTER OFFICERS

A. G. Gierach
American Manganese Steel Div., American Brake Shoe & Foundry Co., Chicago Heights, Ill.
Vice Chairman, Chicago Chapter

J. W. Kelin
Federated Metals Div., American Smelting & Refining Co., St. Louis, Mo.
Secretary-Treasurer, St. Louis District Chapter

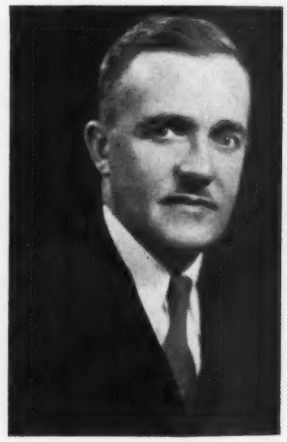
R. W. Mattison
Mattison Machine Works, Rockford, Ill.
Secretary-Treasurer, Northern Illinois-Southern Wisconsin Chapter

N. E. Woldman
Eclipse Aviation Div., Bendix Aviation Corp., Bendix, N. J.
Chairman, Metropolitan Chapter

J. H. Tressler
Hickman Williams & Co., Cleveland, O.
Vice Chairman, Northeastern Ohio Chapter

G. L. White
Westman Publications, Ltd., Toronto, Ontario
Secretary-Treasurer, Ontario Chapter

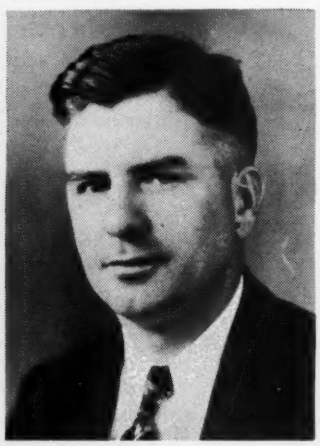
J. R. Reynolds
U. S. Pipe & Foundry Co., Bessemer, Ala.
Vice Chairman, Birmingham District Chapter



H. Klouman
Michiana Products Corp., Michigan City, Ind.
Vice Chairman, Michiana Chapter

J. Morgan Johnson
Tri-City Manufacturers' Assn., Moline, Ill.
Secretary-Treasurer, Quad City Chapter

A. Matheson
French & Hecht, Inc., Davenport, Iowa
Vice Chairman, Quad City Chapter



H. C. Mouat
Whiting Corp., Birmingham, Ala.
Secretary-Treasurer, Birmingham District Chapter

W. B. Coleman
W. B. Coleman & Co., Philadelphia, Pa.
Secretary-Treasurer, Philadelphia Chapter

Abstracts

NOTE: The following references to articles dealing with the many phases of the foundry industry, have been prepared by the staff of *American Foundryman*, from current technical and trade publications.
When copies of the complete articles are desired, photostat copies may be obtained from the Engineering Societies Library, 29 W. 39th Street, New York, N. Y.

Acid-Resisting

HIGH-SILICON CASTINGS. *"How to Produce High-Silicon Acid-Resisting Castings,"* by Frank Marsden, *The Iron Age*, vol. 148, No. 2, July 10, 1941, pp. 54, 120. The following analysis is very high in acid-resisting quality: silicon, 14.5 to 16; sulphur, 0.004 to 0.02; phosphorus, 0.10 to 0.90; manganese, 0.30 to 0.65; and carbon, 0.10 to 0.80 per cent; and is generally known by the chemical industry. It is universally understood by the foundry trade that the successful manufacture of castings to this analysis is both a very hazardous and skilled operation. The methods employed and related in this article might be thought to be unorthodox, but practice has proved beyond a doubt, so far as the manufacture of this material is concerned, that the methods described are the most successful. The author discusses melting, molding, core making and casting procedure; he also comments on stripping the casting, annealing, dressing and machining. (Ca.)

Alloys

See Aluminum Alloys, Quenching.
See Cast Iron, Alloys and High Strength.
See Magnesium, Alloys.

Aluminum Alloys

QUENCHING. *"Quenching Stresses in Aluminum Alloys,"* by Prof. Dr. A. von Zeerleder, *The Journal, Institute of Metals* (London), No. 895, pp. 87-99. A study has been made of the internal stresses in Avional D alloy set up by quenching, and of the possibility of eliminating them by subsequent cold work. The method used for determining the stresses consisted in measuring the dimensional changes of the stock during step-by-step removal of the outer layers. The variables studied were: time between solution treatment and quenching, temperature and nature of the quenching medium, temperature of ageing, the cold working before or after ageing. The stresses are greatest on quenching in water at 20° C., and decrease as the temperature of the water is increased. They are small after quenching in oil, and are practically independent of its temperature. They are materially reduced or even reversed by cold working before or after ageing. (Al.)

Apprentices

CIRCUIT TRAINING. *"Circuit Training Carries Foundry Instruction to Small Communities,"* by George A. Zabel, *The Foundry*, vol. 69, No. 8, August, 1941, pp. 68-69, 106-111. The circuit teaching movement—a method of giving educational opportunities to all workers through the means of traveling trade-competent instructors, who travel from city to city by automobile. This article is concerned chiefly with the educational privileges open to employed and unemployed foundry workers—journeymen and apprentices. A circuit foundry instructor's day is divided into three periods. The morning for travel to the city in which he is to work. He calls on the local vocational school director to receive instructions or information relative to any conditions in the town affecting his program. Afternoons are given over to the instruction of indentured apprentices. Courses are under three headings: foundry mathematics, foundry drawing and foundry related information. The third part of the day is the evening trade extension program. Book work is omitted; making instruction in the form of analysis, such as listing the variety of casting defects and molding difficulties, giving cause, effect, etc. An area day to coordinate his program, during semester changes or during some other period is another job of the circuit instructor. Area day has been a step toward the continued fostering, promotion, and coordination of apprenticeship and trade extension programs. (Tr.)

SHORT TERM TRAINING. *"Short-Term Training at Warner and Swasey,"* by Ray J. Blyth, *The Iron Age*, vol. 148, No. 2, July 10, 1941, pp. 60-63. Because the machine tool industry was one of the first to feel the effects of the defense program it has helped to show the way toward the solution of the training problem. Trainees at the Warner and Swasey plant are of all ages. The chief requirements are the abilities to read blueprints and to handle micrometers. Men accepted for training are put through a trial period which varies from 2 weeks to 2 months. During this period the learners are put to work at simple jobs. When the learner proves that he can use his hands and head and that there is no question about his ability and willingness to work, he is promoted to a job in either the assembly or machine department. He is assigned to work under the direct supervision of an experienced operator. He is taught how to handle tools, some of the simple things in controlling his machine and after learning the intricacies of the machine, begins to handle it by himself. Gradually he is entrusted with the complete control of his machine and left at the machine on which he received his training. (Tr.)

Bombs

See Steel, Bombs.

Bronze Castings

GASES. *"The Effect of Gases on Bronze Castings,"* by I. Frank, *Canada's Foundry Journal*, vol. 14, No. 7, July, 1941, pp. 20-21. Gases play an important part in the unsoundness of castings. All metals absorb a certain quantity of gas, and this increases as the temperature rises. All metals in the liquid state dissolve more gas than they will in the solid state. Also as the temperature of the metal increases at its melting point, the capacity for dissolving gases also increases. Due to these changes of solubility at the solidifying temperature, unsoundness or blow-holes may be formed in the casting. If a metal is saturated with gas at the moment of casting, or even if it contains a greater quantity of gas than the solid metal can hold in solution, there must be a tendency for the excess gas to be liberated during the period of solidification, and unsoundness will then be most likely to occur. The liberation of gas from a metal takes some time, that is, time for the gases to coalesce in the form of bubbles, and either become indirect as such, or escape from the liquid metal. The author points out that as the casting solidifies there must be a tendency for the internal pressure inside such a casting to increase. As internal pressure increases so does the solubility of the gas, and there must be a tendency for the density of the castings to be greater with a diminution in their size. The larger the casting the more likely it is to be unsound due to dissolved gases. Copper contains dissolved hydrogen, copper-sulphate; therefore, gases influencing copper and its alloy consist chiefly of hydrogen, sulphur dioxide and oxygen. (Al.)

Castings

See Acid-Resisting, High-Silicon Castings.
See Magnesium, Castings.

Cast Iron

ALLOYS AND HIGH STRENGTH. *"Foundry Technique in the Production of High Strength and Other Types of Alloy Gray Iron Castings,"* by A. E. McRae Smith, *Foundry Trade Journal*, vol. 65, No. 1299, July 10, 1941, pp. 19-21, 30. This paper contains details concerning some of the more important points, such as methods and compositions to be adopted to meet the new specification B.S.S. 786, Grade IV, and difficulties encountered in using high phosphorus cast irons for complicated castings. Also emphasized is the importance and utility of the nickel molybdenum cast irons as a ready and comparatively simple means of meeting the higher mechanical properties required by the new Grade IV specification. The fact that cupola melted cast irons of this type were particularly easy to handle, and invariably show mechanical properties very considerably in excess of the minimum called for in B.S.S. 786, Grade IV, are stressed. The author also states a warning to foundrymen that close attention must be given to foundry technique in order to ensure complete sound-

ness of structure and freedom from liquid shrinkage defects in all parts of every casting whether the material is a high-strength cast iron or otherwise. (C.I.)

BRAKE DRUMS. *"Brake Drums,"* by Oliver Smalley, ***Foundry Trade Journal***, vol. 65, No. 1298, July 3, 1941, pp. 6-7. A series of brake drums were made with the following composition: T.C., 3.26; Si, 1.92; Mn, 0.86; S, 0.098; P, 0.108; Ni, 1.23; and Cr, 0.25 per cent. The drums were tested on a Timken dynamometer and were instructive because they demonstrated the effect of both composition and microstructure on the service of brake drums under identical conditions. Scoring took place on these drums when the temperature gradient developed in the drum was not steep enough to set up the mechanism of reversal of expansion and contraction of the metal itself. Scoring also bears some relation to relative hardness of the lining and the drum. Thermal checking occurred when the temperature gradient between the braking surface and the center of the drum were too steep for the drum to take care of. Cast iron, while the best of cheap drum material, is still indeterminate. Cast iron brake drums of practically identical composition may not possess the same structural make-up or the same physical properties. In conclusion the author points out that the primary considerations of a good brake drum material are: to select the correct structure in combination with the best mechanical properties for the particular service conditions to be encountered; and uniformity, every brake drum must have the same structure regardless of design or dimensions. (C.I.)

DEFLECTION. *"A Study of Some of the Factors Affecting the Resistance of Cast Iron to Deflection Under Load at High Temperatures,"* by L. W. Bolton, The Iron and Steel Institute ***Preprint*** (London), May, 1941, pp. 1-16. A study has been made of some of the factors affecting the resistance of cast iron to deflection at high temperatures. A method of testing was developed in which a bar of standard dimensions was rigidly held at one end, while the other end was loaded, the stressed portion of the bar being held at a constant temperature of 850° C. The deflection of the free end of the bar was recorded and measured. The effect of composition was studied and it was found that both silicon and phosphorus increased the resistance of cast irons to deflections at 850° C. Graphite size was found to have an important influence on the results obtained, and in the case of irons of similar composition, those having coarse graphite flakes will deflect more rapidly than those in which the graphite is in a finer state of division. Three plain carbon steels were tested for comparison, and it was found that the rigidity of these steels at 850° C. was less than that of many of the cast irons tested. An examination also was made of the rigidity of two types of austenitic cast iron. These were found to have a good resistance to deflection at the temperature of the tests. The rigidity of these austenitic irons was increased by additions of chromium. (C.I.)

SULPHUR. *"Sulphur in Cast Iron,"* by Dr. J. T. MacKenzie, ***Pig Iron Rough Notes***, No. 85, Summer, 1941, pp. 13-16. Experiments for the determination of the effect of sulphur on strength led to interesting manganese influences. Holtby and Dowdell worked with high-manganese electric furnace irons, and found very little effect up to about 0.18 per cent sulphur. Another investigation revealed that hardness increased rather rapidly after 0.15 per cent sulphur and that machinability dropped sharply at 0.20 per cent sulphur, but their manganese was low (0.32-0.36 per cent). The reason for the strong influence of manganese is that iron-sulphide dissolves in the iron, particularly in the iron-carbides, whereas manganese sulphide is practically insoluble, and has no effect as small inclusions. If the manganese is not sufficient to prevent the formation of iron sulphide, this has a powerful stabilizing effect on the carbides, and thus increases chill, hardness and brittleness. Another troublesome effect of very high sulphur, with high manganese, is the pronounced tendency for the manganese sulphide to separate out during freezing. The absorption of sulphur in the cupola is affected by numerous things, but two important items are: the sulphur content of the coke and the size of the metal. Sulphur absorption seems to occur mainly above the melting zone, so a high stack and slow melting increases the pick-up. Pouring high-sulphur iron into the top of a tall mold will give castings full of blow-holes, according to one investigator, but by lowering the molds, and pouring quietly, sound castings were obtained. (C.I.)

See Acid-Resisting, High-Silicon Castings.
See Malleable Iron, Duplexing.

Cupola

BRIDGING. *"Bridging—A Costly Nuisance,"* by M. L. Carl, ***Pig Iron Rough Notes***, No. 85, Summer, 1941, pp. 23-26. Bridging, or freezing of slag and iron when the blast strikes it near the tuyeres, is about the most common trouble encountered in cupola operation, and one of the most difficult to eliminate, regardless of the size of the cupola. The author presents data concerning when bridging will start, to what area it is confined and how it prevents a good quality iron from being produced. Methods and means of counteracting bridging are then set forth which include composition and volume of slag; fluxing and front slagging. (F.)

FIFTEEN-INCH. *"Construction and Operation of a 15-inch Cupola,"* by Fulton Holtby, ***The Foundry***, vol. 69, No. 8, August, 1941, pp. 66-67, 114-116. Trend in the cast iron foundry industry in recent years has been toward using smaller cupolas. The author, in this article, explains the construction and operation of a 15-in. cupola used at the University of Minnesota for instructional purposes and cupola research work. A detailed description is given of the cupola concerning its shell, windbelt, breast opening and other features. The furnace has a normal melting rate of 30 lb. per. min., or 1800 lb. per hr., and usually is required to melt 3600 lb. for a heat. Description and steps taken in lighting the cupola are presented. By using a definite tapping schedule, the carbon analysis is controlled to plus or minus 5 points. (F.)

Duplexing

See Malleable Iron, Duplexing.

Foreman Training

LEGISLATION. *"The Foreman and the Law,"* ***Supervision***, vol. 3, No. 5, May, 1941, pp. 11, 25. This is a discussion of some of the management problems faced by plant executives and foremen under the Wage and Hour Law. It presents material on who is affected by the new law, what the minimum wage shall be, a few of the persons who are under the act, some rules as what not to do and how to keep time records. (Tr.)

Furnace

See Cupola, Bridging.
See Cupola, Fifteen-Inch.

Gases

See Bronze Castings, Gases.

Gating

See Non-Ferrous, Gating

Heat Treatment

See Magnesium, Castings.

Magnesium

ALLOYS. *"Magnesium Alloys—Physical Characteristics,"* by F. A. Fox, ***The Metal Industry*** (London), vol. 49, No. 1, July 4, 1941, pp. 2-7. This is a review of magnesium alloys, cast and wrought, their composition, working techniques, mechanical properties, how they are heat treated and microstructure. Tables in the paper reveal chemical compositions and mechanical properties of Elektron casting alloys, as cast; Elektron extrusion and forging alloys; Elektron rolling alloys and Elektron casting alloys, as heat treated. (Al.)

CASTINGS. *"Magnesium Sand Castings,"* by N. M. Briskin, ***The Iron Age***, vol. 148, No. 2, July 10, 1941, pp. 47-53. Due to the fact that magnesium foundry practice is still in its infancy, there is much conflict of opinion as to best practice, and literature on work done in this country is still comparatively scarce. This article attempts to make a brief survey of literature published in both the United States and abroad, and to contribute some facts which the writer has obtained through his own experience. Readers must keep in mind that although proper reference to published literature is made, many of the opinions expressed here are only the author's personal views on the subject of magnesium founding and do not necessarily coincide with accepted practice of any commercial magnesium foundry. (Al.)

Malleable Iron

DUPLEXING. *"Malleable Duplexing,"* ***Canadian Metals and Metallurgical Industries***, vol. 4, No. 5, May, 1941, p. 120. Two outstanding developments in melting malleable cast iron are duplexing and pulverized coal-firing. Reduction of carbon from the minimum obtainable from the cupola is still the principal problem in the duplexing process, but is being met to the extent that 30 per cent of the present total capacity of malleable iron in the United States is duplexed. The urge to duplex is based upon the lower cost of metal at the spout and provision for a continuous supply. Probably the most outstanding single factor in this method or process is the fact that the various operations in both melting and in molding are carried out continuously over the working hours of the day. The duplexing process is not recommended where the daily melt falls below 30 or 35 tons, and obviously the larger the melt, the greater the savings per ton of castings produced. (C.I.)

Management

Cooperation. *"The Foundryman and the Metallurgist,"* by F. Dunleavy, *Foundry Trade Journal,* vol. 64, No. 1273, January 9, 1941, pp. 24-26. The guess work has been taken out of foundry practice by the advent of the metallurgist. The metallurgist has been trained to be accurate and not to rely too much on human judgment. It is hoped to show in this article what can be accomplished by cooperation and common sense between the foundryman and the metallurgist. Various incidents are related concerning melting, pouring, sand control and general foundry practice whereby the foundryman and metallurgist have collaborated to straighten out these problems. (Tr.)

Metallography

Specimen Mountings. *"Cibanite Mountings for Metallurgical Specimens,"* by Beth Walsh, *The Iron Age,* vol. 148, No. 4, July 24, 1941, pp. 48-49. The technique of preparing and using Cibanite, a condensation product of aniline, hydrochloride and formaldehyde, for metallurgical mountings is explained herein. Cibanite mountings have been found extremely suitable for all types of metallurgical mountings, including fine wires, strips and ordinary specimens. (Te.)

Steel

Bombs. *"Symington-Gould Makes Cast Steel Bombs,"* *The Foundry,* vol. 69, No. 8, August, 1941, pp. 54-55. A pictorial display showing various steps in the production of 250-lb. cast steel bombs made in the Symington-Gould foundry. These pictures illustrate how these bombs are gated and risered, how they are poured, tested and other interesting information. (S.)

Committees Organized

(Concluded from Page 3)

The research project involves first, the preparation of a book on cupola theory and operation, this to be followed by research investigations of special phases in the operation of this furnace. At the present time, according to a report from the committee, it is making a review of existing published literature, this review being carried on by Schuyler Herres, Battelle Memorial Institute, Columbus, Ohio. Battelle Memorial Institute and the Cupola Research committee are financing this literature review.

Sand Shop Operation Course: Chairman, E. E. Woodliff, Harry W. Dietert Co., Detroit, Mich. This committee is listed as a general interest committee because each year it stages sessions devoted to the practical application of sand control in the foundry and to the solution of sand problems in the various divisions of the industry, gray iron, steel, non-ferrous and malleable. The sessions staged by this committee have been some of the best attended and the most interesting held at conventions for many years.

H. M. St. John
Chairman,
Lecture Course
Committee

E. E. Woodliff
Chairman,
Sand Shop
Operation Course
Committee

Lecture Course: Chairman, H. M. St. John, Crane Co., Chicago, Ill. This is one of the newer committees and has for its function the planning of annual lecture courses which, since 1939, have become a regular part of the technical activities at annual conventions. The first lecture course was staged in 1939 with Roy M. Allen, consulting metallurgist, Bloomfield, N. J., as the lecturer. Mr. Allen gave a series of four lectures on the fundamentals of cast iron metallurgy and the use of the microscope in the foundry. In 1940, Dr. C. W. Mason, Cornell University, Ithaca, N. Y., gave a series of four lectures on the subject, "Close-Ups of Crystal Behavior, Illustrated by Microprojection." In 1941, Harry W. Dietert, Harry W. Dietert Co., Detroit, was the speaker on "Core Room Theory and Practice." This series will be continued at the 1942 convention.

September Chapter Meeting Schedule

September 6

Western Michigan
Spring Lake Country Club,
Muskegon, Mich.
Outing

September 9

Cincinnati
Shuller's Restaurant
R. C. Suran, Federal Bureau of Investigation
"F. B. I. in Cooperation with National Defense"

September 11

Northeastern Ohio
Cleveland Club, Cleveland
F. D. Bowman, Adv. Mgr., Carborundum Co.
Color Movies

St. Louis
Hotel DeSoto, St. Louis
"Sand and Core Practice"

September 12

Central New York
Onondaga Hotel, Syracuse, N. Y.
D. J. Reese, International Nickel Co.
"The Cupola and Its Operation"

Northern California
Alexander Hamilton Hotel, San Francisco
W. M. Hale, Federal Reserve Bank
"Our National Defense Program"

September 13

Central Indiana
Lakeshore Country Club, Indianapolis
Outing

September 15

Quad City
LeClaire Hotel, Moline
N. J. Dunbeck, Eastern Clay Products, Inc.
"Synthetic Sand"

September 20

Michiana
Christiana Country Club, Elkhart, Ind.
Outing

Birmingham District
Sixth Annual Barbecue, Pine View Beach

Twin City
Bayport, Minn.

September 26

Chesapeake
Engineers Club, Baltimore, Md.
Pat Dwyer, *The Foundry*
"Gates and Risers"

September 27

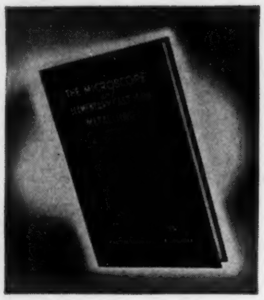
Chicago
Lincolnshire Country Club, Crete, Ill.
Outing

Book News

DEMAND NECESSITATES SECOND BINDING OF

THE MICROSCOPE IN ELEMENTARY CAST IRON METALLURGY

By R. M. ALLEN



Due to the demand of thousands of American foundrymen it was necessary for the American Foundrymen's Association to bind 1500 more copies of the "microscope book". This book, one of the most practical of its kind, has been requested by apprentices and journeymen for use in the study of elementary cast iron metallurgy. Instructors have found it extremely valuable in apprentice and defense training courses. Written by an eminent authority, this text is known for its clear and concise readability in connection with the vast amount of practical data presented. Containing over 60 illustrations of structures occurring in various cast irons and over 150 pages with 75 tables and illustrations, this book is offered to members and non-members at NO INCREASE IN PRICE. Fill out the order blank at the bottom of the page and mail today.

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These Three Sections Cover:

Core Mixtures—Requirements of a core mixture for steel castings, malleable castings, non-ferrous castings; typical mixtures are shown. Contains 16 pages.

Core Binders—Discusses types of core binders and requirements; some specifications. Contains 29 pages.

Controlling Properties of Cores—Covers sand mixing and testing. Contains 41 pages.

Members' Price: $1.00 per set or 50 cents per copy.
Non-members' Price: $2.00 per set or $1.00 per copy.

AMERICAN FOUNDRYMEN'S ASSOCIATION, Inc.
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Enclosed you will find $........... for the following publications:

...... The Microscope in Elementary Cast Iron Metallurgy, by R. M. Allen. Members, $1.50; Non-members, $3.00.

...... Core Mixtures. Members, 50 cents; Non-members, $1.00.

...... Core Binders. Members, 50 cents; Non-members, $1.00.

...... Controlling Properties of Cores. Members, 50 cents; Non-members, $1.00.

...... Set of three lecture course preprints. Members, $1.00; Non-members, $2.00.

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